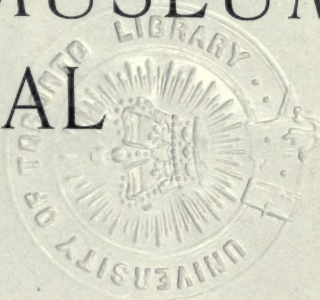


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Natural History

THE AMERICAN MUSEUM JOURNAL



EDITED BY
MARY CYNTHIA DICKERSON

VOLUME XIV, 1914

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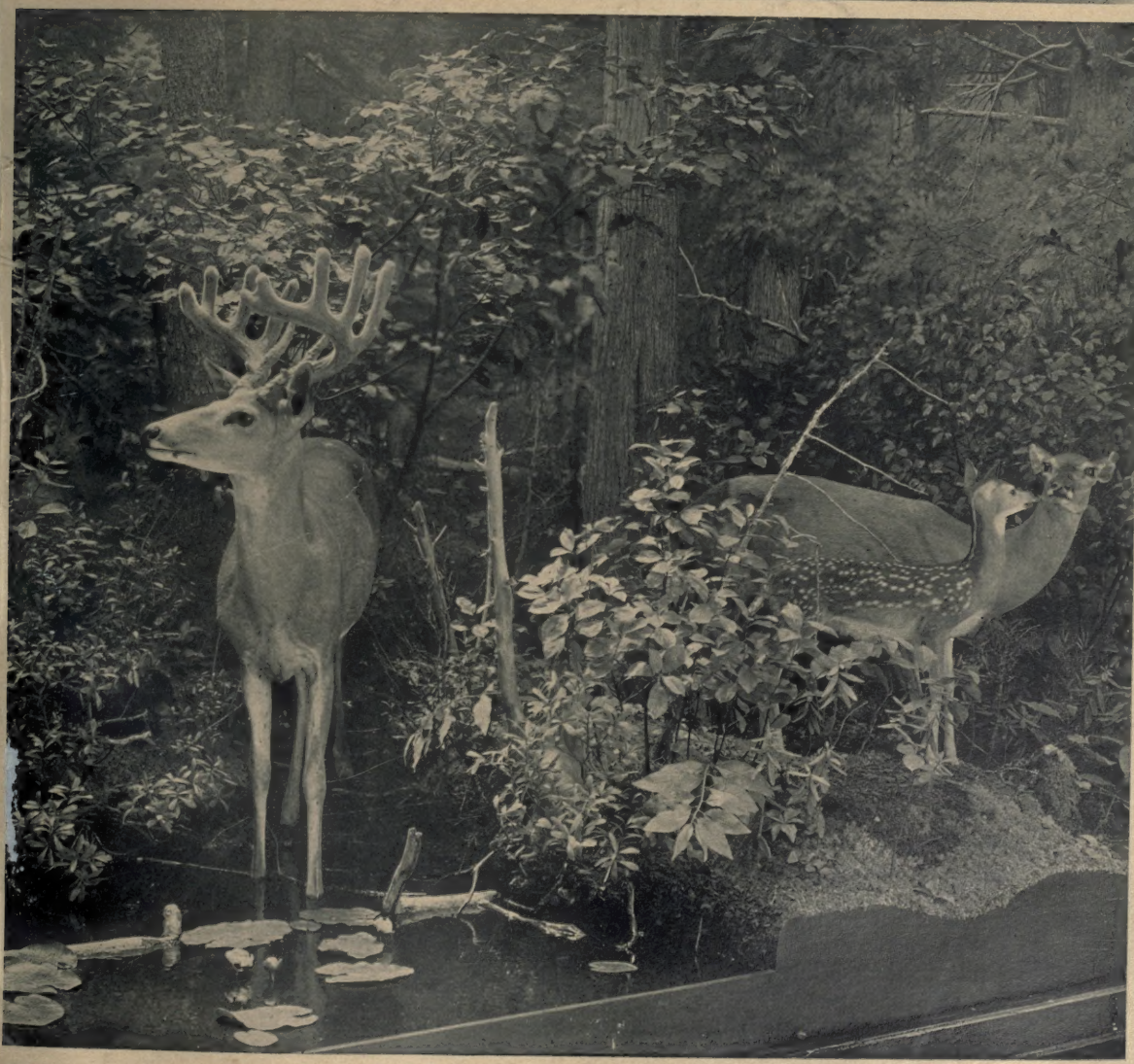
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The American Museum of Natural History was established in 1869 to promote the Natural Sciences and to diffuse a general knowledge of them among the people, and it is in cordial coöperation with all similar institutions throughout the world. The Museum authorities are dependent upon private subscriptions and the dues from members for procuring needed additions to the collections and for carrying on explorations in America and other parts of the world. The membership fees are,

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The Museum Library contains more than 60,000 volumes with a good working collection of publications issued by scientific institutions and societies in this country and abroad. The library is open to the public for reference daily — Sundays and holidays excepted — from 9 A. M. to 5 P. M.

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Guides for Study of Exhibits are provided on request by the department of public education. Teachers wishing to bring classes should write or telephone the department for an appointment, specifying the collection to be studied. Lectures to classes may also be arranged for. In all cases the best results are obtained with small groups of children.

Workrooms and Storage Collections may be visited by persons presenting membership tickets. The storage collections are open to all persons desiring to examine specimens for special study. Applications should be made at the information desk.

The Mitla Restaurant in the east basement is reached by the elevator and is open from 12 to 5 on all days except Sundays. Afternoon Tea is served from 2 to 5. The Mitla room is of unusual interest as an exhibition hall being an exact reproduction of temple ruins at Mitla, Mexico.

THE AMERICAN MUSEUM JOURNAL

VOLUME XIV

JANUARY, 1914

NUMBER 1

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MARY CYNTHIA DICKERSON, *Editor*

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AMERICAN ROBIN GROUP

THE FIRST BIRD GROUP IN THE AMERICAN MUSEUM

The American robin group was mounted by Jenness Richardson in 1887. The wax leaves and flowers were made by Mrs. Mogridge, who introduced the work into the United States. This was the first of the very large series of bird groups now represented in the American Museum

THE STORY OF MUSEUM GROUPS

Part I

By Frederic A. Lucas

****: quæque ipse [feliciſſima] vidi
Et quorum pars [minor] fui

THE many groups of animals in the American Museum of Natural History represent many phases of what may be termed "the group question" and illustrate the various steps that have led from the dreary exhibits of forty years ago to the present realistic pictures of animal life. Twenty-five years ago, even, there was scarcely a group of animals, or a descriptive label, in any museum in the United States. It is to be noted that the qualifying adjective *scarcely* is used, for even twenty-five years ago there were a number of animal groups in our museums, though it was still a moot question whether their display was a legitimate feature of museum work, and the educational possibilities of such exhibits were realized by few.

Museum authorities are somewhat conservative and as museums at first were mainly for the preservation of material for students, their educational value to the public was not considered. The principal object in mounting animals, especially mammals, was to preserve them and put them in a condition to be studied and compared one with another. Groups were not even thought of and, as Dr. Coues wrote as late as 1874: "'Spread eagle' styles of mounting, artificial rocks and flowers, etc., are entirely out of place in a collection of

any scientific pretensions, or designed for popular instruction. Besides, they take up too much room. Artistic grouping of an extensive collection is usually out of the question; and when this is unattainable, halfway efforts in that direction should be abandoned in favor of severe simplicity. Birds look best on the whole in uniform rows, assorted according to size, as far as a natural classification allows." The only use of groups was for a few private individuals and they were mainly heterogeneous assemblages of bright-plumaged birds brought together from the four quarters of the globe and shown simply because they were pretty.

So far as we are aware, the introduction of groups into public museums was due to the influence of an enthusiastic private collector, Mr. E. T. Booth, of Brighton, England, who devoted a large part of his life to making a collection of British birds, mounted in varied attitudes, with accessories that copied more or less accurately the appearance of the spot where they were taken. As Mr. Booth wrote, "the chief object has been to endeavor to represent the birds in situations somewhat similar to those in which they were obtained; many of the cases, indeed, being copied from sketches taken on the actual spots where the birds themselves were shot." These groups were intended to be viewed from the front only and were arranged in cases of



GROUP OF GOLDEN EAGLES
Booth Museum, Brighton, England. Mounted in 1877

standard sizes, assembled along the side of a large hall. The collection, which was begun not far from 1858, was bequeathed to the town of Brighton in 1890, and is known as the Booth Museum, and we earnestly hope that it may endure for many years to come.

Montagu Brown of Leicester adopted the methods of Mr. Booth and a little later, through the instrumentality of R. Bowdler Sharpe, the first small "habitat group" of the coot was installed in the British Museum. Now it is rather interesting to note that some naturalists who are best known by their scientific work, and are usually regarded by the

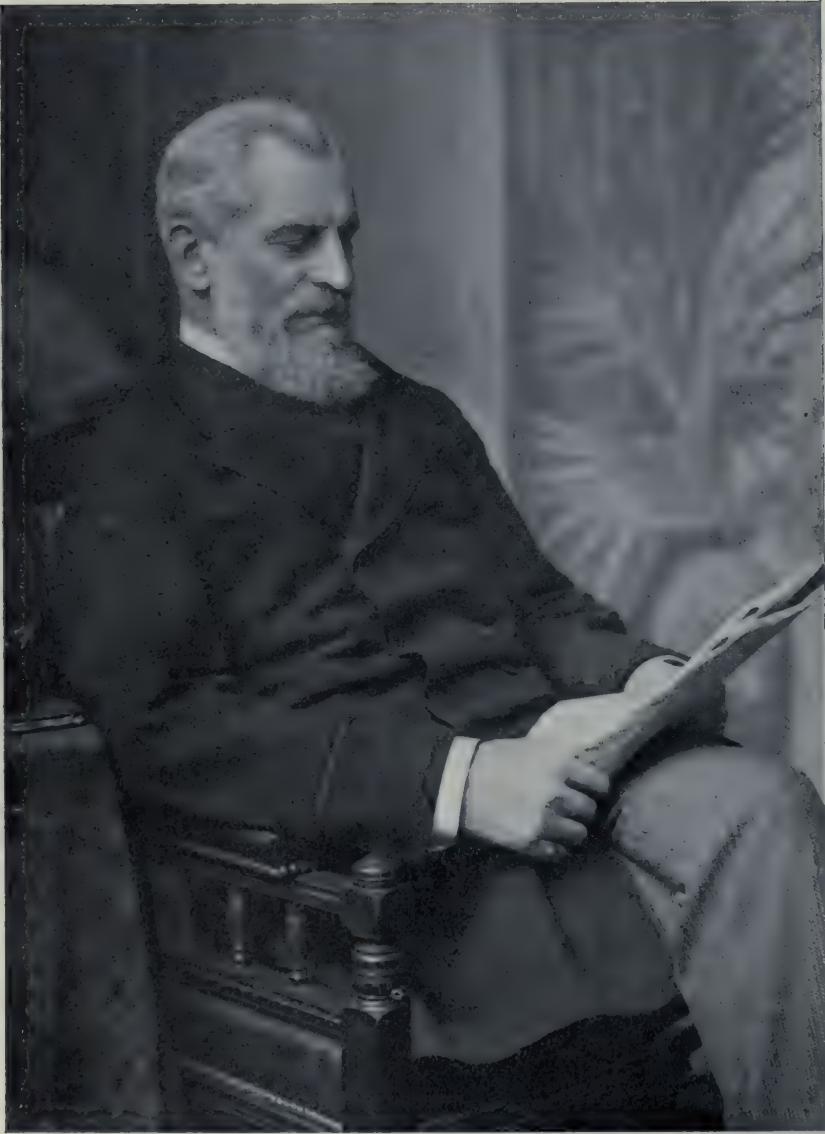
public as being of the dry-as-dust type, were among the earliest advocates of naturalistic methods in museum exhibits. Thus, to Dr. Sharpe, whose enduring monument is the *British Museum Catalogue of Birds*, and to Dr. Gunther, best known for his systematic work on fishes, we are indebted for the introduction of groups into a great public museum and for obtaining for them the recognition of a scientific institution of long standing.

The installation of bird groups in the British Museum made good progress under the administration of Sir William Flower, who took especial interest in the



R. BOWDLER SHARPE

Under whose auspices the first of the bird groups was installed in the British Museum



SIR WILLIAM HENRY FLOWER
DIRECTOR OF THE BRITISH MUSEUM FROM 1884 TO 1898

Sir William Flower probably did more than any other man to change the character of museum exhibits and make them attractive as well as instructive. He not only planned the exhibits and gave his personal attention to their installation, but in some instances he prepared the specimens himself. In this country like credit should be given to Dr. G. Brown Goode, who was an ardent admirer of Flower and his work in the British Museum

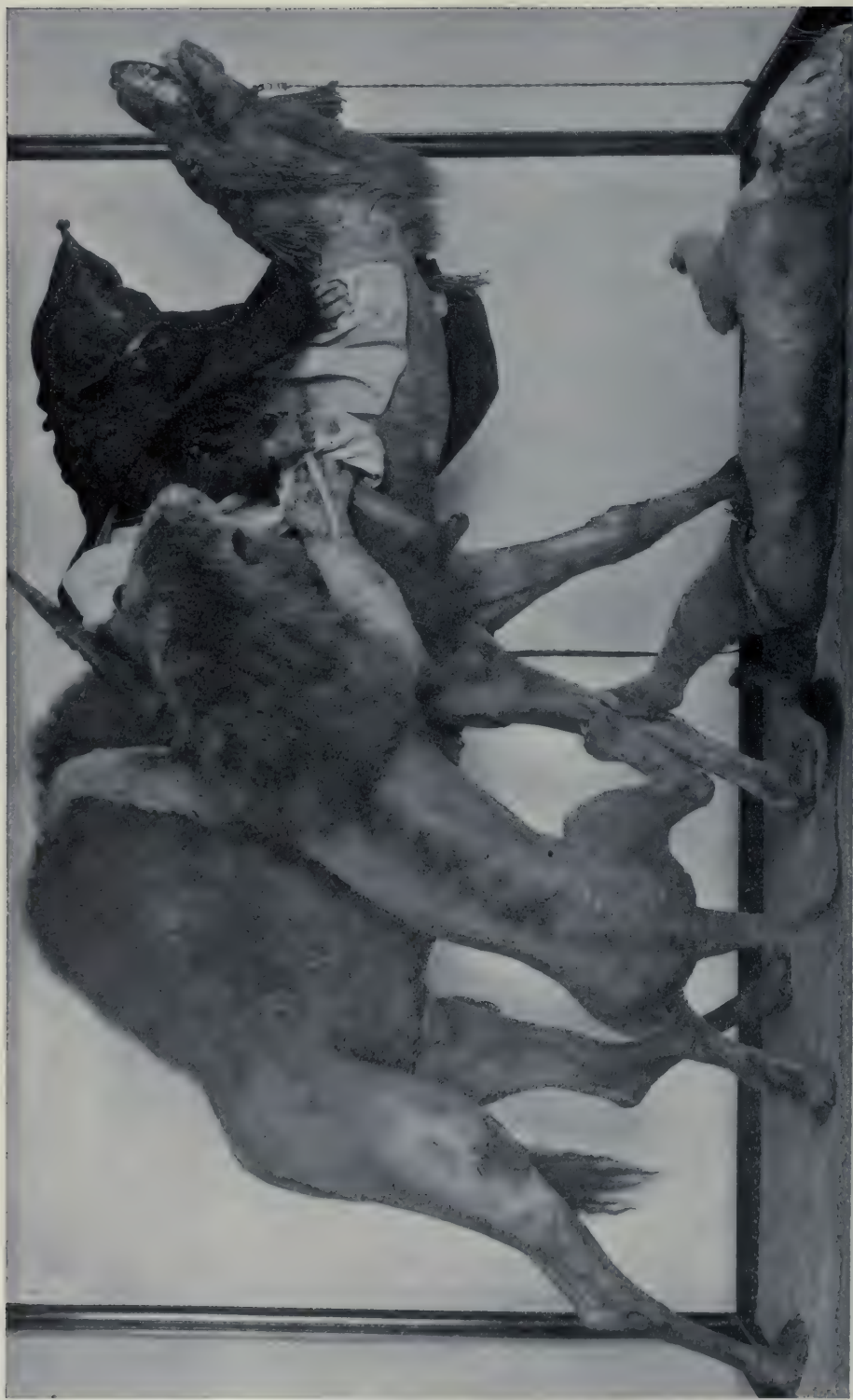


Robin redbreast group in the British Museum

educational side of museums and in the introduction of exhibits that were attractive, as well as instructive, to the general visitor.

The first group in the American Museum, an Arab courier attacked by lions, was purchased in 1869 and shown in the old Arsenal building in Central Park, then the home of this institution. This

group may have been theatrical and "bloody" but, as a piece of taxidermy, it was the most ambitious attempt of its day. Moreover it was an attempt to show life and action and an effort to arrest the attention and arouse the interest of the spectator, a most important point in museum exhibits. If you cannot interest the visitor you cannot



ARAB COURIER ATTACKED BY LIONS

Mounted at the *Maison Verreaux*, Paris, for the Paris Exposition of 1869. This was the first group in the American Museum of Natural History. At present it is owned by the Carnegie Museum, Pittsburgh



à Jules Bailly.
Souvenir affectueux
J. V. Verreaux.
Paris le 25 août 1871.

JULES VERREAUX
NATURALIST, TRAVELER, TAXIDERMIST

instruct him; if he does not care to know what an animal is, or what an object is used for, he will not read the label, be it never so carefully written. The Arab courier group was prepared under the supervision of Jules Verreaux, the French ornithologist and African traveler, for the Paris Exposition of 1867, where it was awarded a gold medal. This group may have suggested the combat between a lion and tiger, displayed in the Crystal Palace, or that, as well as a similar group

It is worth noting here that the *Maison Verreaux* suggested to Professor Henry A. Ward the possibility of establishing a similar institution in the United States; whence the well-known Ward's Natural Science Establishment at Rochester, New York. And we cannot help feeling that Ward's Establishment had much to do with the history of animal groups. Hither came and hence departed many a man who directly or indirectly did much to advance the art of taxidermy and



Group of the black-throated loon in the British Museum, one of the nesting groups of British birds

formerly in the Calcutta Museum, may have originated independently. The last mentioned group illustrates the importance and effect of something that attracts attention: when the Dalai Lama visited the Calcutta Museum, it soon became apparent that he was looking for some particular object, and it later developed that this was the fighting lion and tiger whose fame had traveled into far distant Tibet.

make possible the existing order of things. Named according to the time of their coming, Hornaday, Webster, Wood, Critchley, Turner, Denslow, and Akeley were all graduates of the old Establishment. Perhaps some of them do not like to be considered as taxidermists, but we can hardly call my friend Wood, whose birds lack nothing save voice and movement to make them seem alive, an animal sculptor, and we



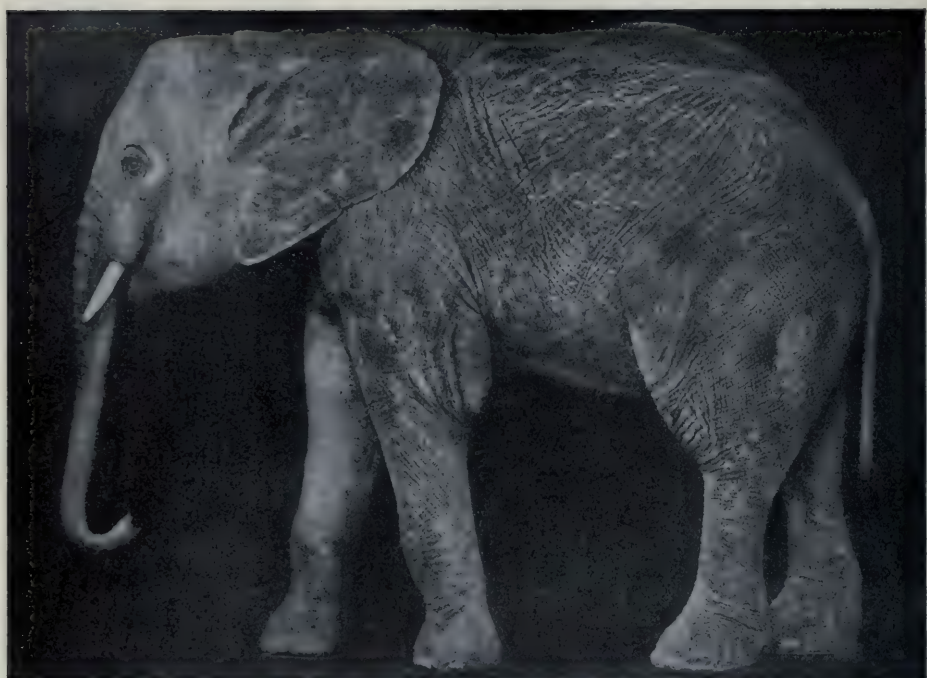
Group of orang-utans in the American Museum. Collected and mounted in 1880 by W. T. Hornaday. This was the first large mammal group in the American Museum [Manikin of excelsior and tow] This cut reproduced from a wood engraving in *Harper's Weekly*, is a reminder of the time when half tones were unknown

hope no one will take offense at being called a taxidermist.

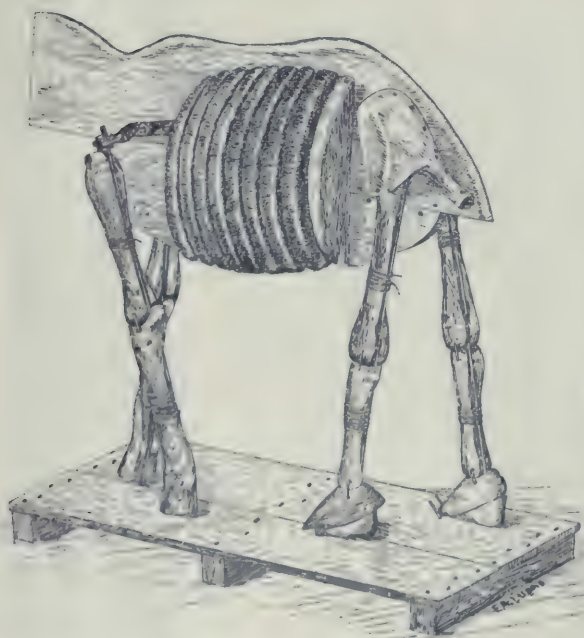
As there are so-called sculptors, who are mere makers of figures, and will be that, and that only, to the end of their days, so there are taxidermists, men like Akeley, Clark and Blaschke, who are sculptors in every sense of the word. And in some ways their task is more difficult than that of the sculptor who deals only with plastic clay, for the taxidermist has not merely to prepare his model, but to fit over it a more or less unyielding hide, a hide that does not conceal the defects of the model but has defects of its own to be hidden. Probably no one who has had actual experi-



Papier-mâché manikin for an orang-utan. By Remi Santens



African elephant Mungo in United States National Museum. Mounted by W. T. Hornaday in 1882



The framework of Mungo

ence in mounting large mammals would question this, though probably few visitors realize the great progress that has been made in the mounting of animals, particularly large mammals. Not very many years ago animals were most literally stuffed — suspended head downward and rammed full of straw, often until they could hold no more. Then came the making of a manikin of tow and excelsior; next the manikin of wire-netting and papier-mâché, and finally the modeling of the animal in clay, the molding of this

in plaster, and the making of a light and durable form upon which the skin is deftly placed, copying the folds and wrinkles of life.

If he who delves among books in various dead and living languages to decide which of the numerous many-syllabled names some small creature is rightly entitled to bear does not object to being called a taxonomist, he who works upon the skins of creatures great and small should not object to the rightful name of taxidermist. So taxidermist let it be for the present, or until a better name is coined.

The group of Arab and Lions was followed about a decade later, 1880, by the group of oranges collected by Hornaday, mounted by him shortly after his return from a two years' collecting trip around the world and presented to the Museum by Robert Colgate.

This again leads us to note that the energy of Dr. Hornaday had much to do with the formal introduction of animal groups into the American Museum of Natural History and recognition of their place in museum work, because Jenness Richardson was a pupil of Hornaday, and Rowley in turn a pupil of Richardson and by them, and under their supervision was begun the series of groups now justly famous.

These early groups did not find their way into museums without protest as may be imagined from the remarks of Dr. Coues quoted on a previous page but in 1887 the first group of mammals was installed in the United States National Museum, and this was followed a year later by a large group of bison.

The other day, when listening to the protest of a curator against the withdrawal of a certain group from exhibition, we wondered if he remembered another protest, against the introduction of a

bone that a coyote might have some excuse for action. Verily *tempora mutantur*.

An important factor in the evolution of groups and their introduction into museums was the development of the art, for art it is, of making accessories, for without the ability to reproduce flowers and foliage in materials that would at once have the semblance of reality, and endurance under the vicissitudes of temperature in the intemperate zone in which most museums are located,



Manikin of wire cloth and papier-mâché by Remi and Joseph Santens. Photograph to illustrate strength of modern manikin

half the charm and value of groups would be lacking. For progress in this direction we are indebted primarily to the Messrs. Mintorn of London and their sister, Mrs. Mogridge, who devised methods and reproduced the foliage in the groups of birds in the British Museum, and who later came to New York to carry on the same work for the small bird groups.¹

¹ A description of these methods, improved upon by apt pupils is to be found in *Plant Forms in Wax, Guide Leaflet No. 34*, published by the American Museum.



1 — Lioness — an example of early work

2 — African lion mounted at the *Maison Verreaux* about 1865

3 — African lion, Hannibal, mounted at the American Museum of Natural History by James L. Clark in 1906. All three specimens are on exhibition in the American Museum at the present time

The earliest bird groups in the American Museum of Natural History, the first of which was very appropriately the American robin, were made largely after those in the British Museum and installed each in a small case so as to be viewed on four sides. They thus differed from their prototypes in the Booth Museum which, as noted, were intended to be seen from one side only.¹

They were all groups of small or moderate size and confined to species found within fifty miles of New York City. The time was not yet come, though it was near at hand, for the execution of the large naturalistic groups with which we are now familiar, and Museum officers and trustees would have hesitated to incur the time and cost involved in their preparation.

¹ These early American Museum bird groups, thirty-four in number, have recently been brought together under the title of "Local Birds" in the west corridor of the second floor



SMALL PORTION OF THE AMERICAN BISON GROUP

This is one of the largest groups of a single species of animal ever attempted and as such has never been improved upon. Mounted in 1889 by Jenness Richardson, for many years chief taxidermist in the American Museum. The American bison and the moose groups, the latter by John Rowley, are the masterpiece mammal groups in the American Museum



PORTION OF THE RUINS OF THE NUNNERY OR "MONJAS" AT CHICHEN ITZÁ

The main range of chambers of the rambling nunnery is a finely preserved building with geometric ornamentation

A CHAPTER OF ANCIENT AMERICAN HISTORY

By Herbert J. Spinden

With photographs by the Author

THE wreck of human handicraft touches the heart and none of us can fail to invest a ruined city with the purple haze of romance. At least it is safe to say that not a traveler in Yucatan and Central America but has been deeply stirred by the vestiges of ancient empire that lie scattered through the jungle. The ruins of Chichen Itzá, long famous on account of their size, accessibility and healthful situation, have been explained by fanciful tales or wrapped in impenetrable mystery according to the mood or stock of information of the person describing them. It does not detract from the wonder of this city or the grandeur of its buildings to say that the light of recorded history, somewhat faintly to be sure, shines upon its foundation, its periods of brilliancy and decadence and its final abandonment. But first let us view the monuments that time has spared.

To visit Chichen Itzá, which is situated in northern Yucatan not far from Valladolid, we leave the narrow gauge railroad at the station of Dzitas and then jolt for a never-to-be-forgotten fifteen miles over the solid limestone plain in a vehicle called a *volan*. This

word *volan* means in Spanish "they fly" but judging by unhappy experience, "they leave the earth frequently and return with emphasis" would be a better etymology to follow. The *volan* is a high, two-wheeled cart which travels at top speed behind several mules. It has no seat for the passenger but instead a sort of box, hung from a stiff frame, in

which he reclines. As this primitive transport lurches along the road, glimpses over the edge of the box may be caught of the tangled jungle on either hand with here and there a trail making off to some *milpa* or cornfield. Finally, when misused flesh and bone can hardly stand another bounce, we arrive at the village of Pisté with its little cluster of palm-thatched huts. A few moments later, on rounding a curve, we flash into sight of a stone temple crowning a lofty pyramid — and about us lie the ruins of Chichen Itzá, a capital city of the ancient Maya empire.



Atlantean figure carved from a single block. At Chichen Itzá occur table altars, consisting of a flat stone carried upon the heads and hands of figures of this sort

Northern Yucatan is a limestone plain without streams on the surface, but here and there the roof of a subterranean river has fallen in making huge natural wells called "cenotes". At Chichen Itzá there are two cenotes: one, commonly called the Sacred Cenote, was anciently



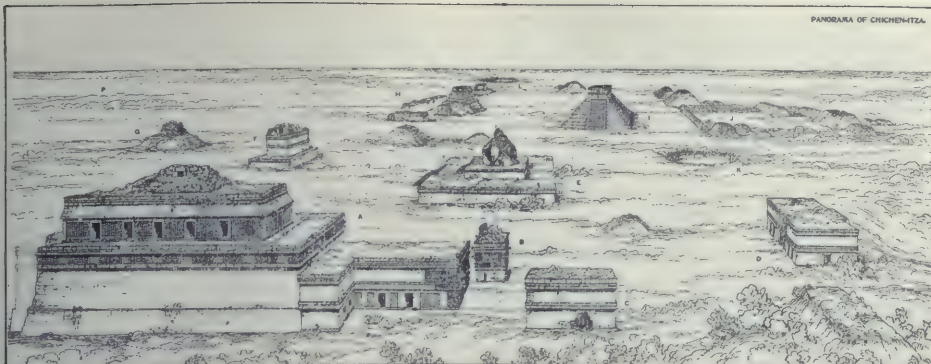
Ruined Spanish church beside the road on the way from Dzitas to Chichen Itzá

used as a place of sacrifice where human victims were thrown into the pool below; the other, called the Grand Cenote furnished water for the inhabitants of the city. The name Chichen Itzá means "the mouth of the wells of the Itzá." The Itzá were a tribe, clan or political division of the Maya nation, who have been named the Greeks of the New World.



The volan is a medieval instrument of torture in which one travels over the Yucatan solid stone roads

At Chichen Itzá seven or eight structures are still in a fair state of preservation, but the bush for miles about is filled with heaps of cut stone that mark the sites of other buildings now in utter ruin. The most impressive structure is doubtless the Castillo or Castle—the temple on the pyramid seen as we entered the ruins. The pyramid rises steeply in nine terraces faced with cut stone and decorated with sunken panels and on each side is a wide stairway with balustrades. The base of the pyramid measures 195 feet and its height seventy-eight feet. The temple on the summit rises an additional twenty-four feet, so the structure as a whole is more than one hundred feet in height. This temple has on one side an ample doorway with two serpent columns, that leads into a vaulted portico. Directly behind this is the sanctuary. On the other three sides of the temple are doorways giving access



Panorama of the ruins of Chichen Itzá. In the foreground at the left are the Nunnery buildings, the smallest, the single-roomed temple figured on page 22; in the background and a little to the right is the Castillo with its lofty stepped pyramid, while immediately to its left is the Ball Court Group of ruins including the famous Temple of the Jaguars. Two cenotes are shown, the Grand Cenote at the right of the center and a second in the extreme central background.

The tops of the ruins of Chichen Itzá rise above the tree tops of a forest which everywhere gives rich color to the plain. The function of the various buildings is thought to have been mainly religious. The names given to the ruins serve only for convenience in description; they may not be appropriate.



The Sacred Cenote in which human victims were thrown. This great natural well is about eighty feet from the rim to the surface of the water. It was made by the falling of the roof of an underground river.



Great sink-hole in the limestone plain similar to the cenote except that the caving in has not reached water level. Such a sink-hole forms a fairy grotto with its cool depths hung with vines and long thread-like roots

to a narrow vaulted passage that leads neither into portico nor the sanctuary. The decoration of the temple consists of sculptured door jambs and lintels, all in bad repair; a mask panel or highly conventionalized serpent head in front view, on the outer walls above each door; two columns, already mentioned, that represent feathered serpents with the heads at the base and the tails serving as the capitol, and an open-work roof ornament reproducing the Greek meander.

From the shaded porch of Mr. Thompson's residence we look across a lawn where the fountain plays and the orange trees hang their golden fruit, to a splendid relic of ancient glory — the great

building known as the Monjas or Nunnery. This rambling structure, richly decorated with grotesque faces and geometric designs, is of especial interest to the archæologist because it shows different periods of growth. In the first place the substructure of the principal range of buildings has been enlarged several times as is made clear by excavations leading into the solid mass. The ground level wing on the east was added after the substructure had received its final enlargement. The small chamber at the top of the Monjas, which may be called the third story, was not contemporaneous with the range of rooms beneath it, first because some of these rooms had to be filled in with earth to support the

CASTILLO OF CHICHEN ITZÁ

The Castillo is the loftiest temple mound at Chichen Itzá and probably the most impressive ruin there. The original cut stone facing of the terraces can be seen in places. A wide stairway ascended the pyramid on each side. The pyramid at the base measures 195 feet across and the structure as a whole rises more than one hundred feet





SMALL TEMPLE CONNECTED WITH THE NUNNERY RUINS

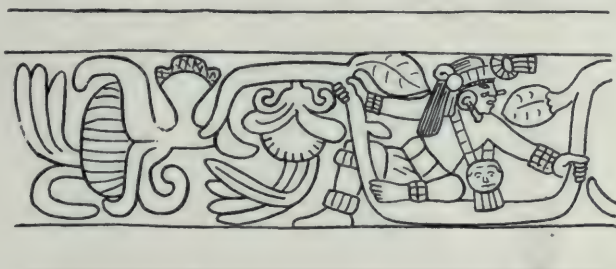
The Iglesia or Church is a small one-roomed temple with a flying façade [front wall elevated one story above the roof] which is clearly made of reused materials. The flying façade is ornamented with three mask panels



Mask panel, front view of modified serpent head, on frieze of Nunnery foundation. The nose formerly projected a foot or more from the wall. A small human face is seen above the serpent nose



Design on door jamb showing classical idea of Atlantean support of weight above



Detail of decorative band in the lower chamber of the Temple of the Jaguars showing the skillful use of a vine and flower motive with small human figures at intervals



Serpent heads formerly set into the walls of temples as frieze decorations, now scattered about on the ground among the ruins

weight above and secondly because the walls of this upper chamber are plainly made of reused material. There is good evidence that the sculptured details of certain other parts of the Monjas were taken from the wreckage of earlier buildings. In close connection with the Monjas are two small temples without substructures, the more interesting one being the single-roomed building called the Iglesia or Church. This little temple

is decorated with mask panels, and has the front wall elevated one story above the roof, an architectural device known as the flying façade. This flying façade bears three mask panels which differ from each other and which are obviously made up of reused material.

West of the Monjas is the Akat'cib, the House of the Dark Writing, so called on account of some hieroglyphic inscriptions. North of the Monjas is the Caracol or Snail, a curious circular tower with a winding stairway.

Still farther to the north is the Casa Colorada or Red House, an admirably preserved building with a long outer chamber and three inner ones. The flying façade of this building is very pleasing with its mask panels flanked by frets. Over the center of the roof rises another wall pierced by windows. This architectural detail, commonly called the roof comb or roof crest, is found in this single instance at Chichen Itzá although often seen in other Maya cities.

Continuing in the same northerly direction we encounter a temple upon a pyramid very similar to the Castillo, but smaller, which has been named the Temple of the High Priest's Grave. This rather fanciful title comes from a deep shaft on the floor leading down to a small burial chamber. In conjunction with this temple are some small platforms which are believed to have been used as stages for dramas or religious ceremonies. Several of these platforms, having stairways on the four sides and sometimes sculptured panels, are found at Chichen Itzá.



End view of the North Temple of the Ball Court. The entire side surface of the North Temple, including the sloping walls of the vault and the round columns in front, is sculptured in low relief

Northwest of the Castillo lies the Ball Court Group with the famous Temple of the Jaguars which has already been described for readers of the *JOURNAL* by Mr. Thompson.¹ The South Temple of this group is a plain building of little interest but the North Temple is very interesting because its entire inner surface, including the sloping surfaces of the vault and the round columns in front is a mass of sculptured detail in low relief. The carvings deal with processions of priests and warriors similar to those on the wall of the Lower Chamber of the Temple of the Jaguars. The Temple of the Jaguars is situated at the southern end of the parallel stone walls of the court. The inner chamber of this temple has excellent frescoes in low relief while the lower chamber at the base of the wall has painted sculptures. The last group of buildings which we have time to consider is the group of

the Columns in the western part of the city. In this extensive ruin there are great rows of columns on platforms as well as several interesting temples. It has been suggested that this part of the city was a

market but nothing that really confirms such a belief has come to light. The temples are mostly of the same general type as the Castillo, with sculptured door jambs and serpent columns. Several of these temples have been only



View of the North Temple of the Ball Court, showing the two cylindrical columns. The figures on the sculptured walls have never been drawn or carefully studied. In general the carvings show processions of warriors and priests similar to those of the lower chamber of the Temple of the Jaguars

partly excavated. One of the most interesting is the Temple of the Tables which takes its name from a table-like altar supported on the uplifted arms of small Atlantean figures. So much for the buildings of Chichen Itzá: let us now examine the question of history.

¹ "The Temple of the Jaguars" by Edward H. Thompson. *AMERICAN MUSEUM JOURNAL*, October, 1913, Vol. XIII, pp. 267-282.



The lower chamber of the Temple of the Jaguars is a mass of interesting sculptures which were primarily painted and which show processions of warriors who bear tributes to various gods. Two rectangular columns formerly supported the façade which has now fallen

When Grijalva and Cortes sailed their caravels to the low-lying, palm-fringed coast of Yucatan in 1517 and 1518, they found the Maya Indians in a state of advancement that excited wonder and

admiration. Yet we know from many documents that not a single one of the great stone-built cities was really occupied at this time. Great trees were growing from the roofs of the buildings



Detail of the sculptured lower chamber of the Temple of the Jaguars [See stones slightly above center in preceding photograph]. The stones seem to have been carved after they were put in place in the wall. Traces of color are still discernible

at Uxmal and while Chichen Itzá was a place of pilgrimage and sacrifice, it is pretty clear that the temples we have just seen were all abandoned and in partial ruin. To restore the history of Chichen Itzá we must review our knowledge of the other great Maya cities situated not only in northern Yucatan but also far to the south and west in Guatemala and Honduras.

The restoration of

Maya history depends upon three lines of study which must be carefully brought into relation, each with the others — namely, traditions, inscriptions and natural developments in art. The first of these is, at first sight, most intelligible. Brief chronicles, called Books of Chilan Balam, were preserved at several towns in northern Yucatan. These chronicles were written in Spanish letters but in Maya words by educated Maya Indians during the sixteenth and seventeenth centuries and were doubtless based upon earlier native documents which contained hieroglyphs and pictures. The events of history recorded in these chronicles are fixed with reference to the katuns or twenty-year periods of Maya chronology. These katuns are distinguished from each other by the numbers one to thirteen which fall in a pecu-

liar order. Any date in the chronicles is definite for a cycle of thirteen times twenty or 260 years. But by putting down all the katuns which passed, whether or not there were historical entries opposite them, the Maya historian prevented confusion in the 260-year cycles and actually carried the historical count over a stretch of seventy katuns, or fourteen hundred years, before the coming of the Spaniards.



Typical vaulted room illustrating the architectural skill of the Maya builders. The vault is a solid concrete mass covered by a veneer of nicely cut facing stones



The plumed serpent in the sculptured lower chamber of the Temple of the Jaguars. This may be identified with Kukulcan, the Maya equivalent of Quetzalcoatl [Drawn from carving in illustration at bottom of preceding page]

Now let us glance at the second line of research — the inscriptions. These are found on monolithic monuments, lintels, tablets and other objects. The inscriptions of the greatest value to the student of ancient American history are those expressing dates in the so-called archaic Maya calendar. This archaic calendar is essentially the same as the one used in the Books of Chilan Balam

so far as the length of the katun is concerned, but by another system of naming the katuns the danger of confusing the 260-year cycles is overcome. Dates in the archaic calendar are exact over vast stretches of time. The most valuable data are found in what is called Initial Series and of these over fifty have been deciphered. The Initial Series is really a number which records the days which intervene between a beginning day, in all cases the same, and the day given in the inscription. We count the years from the birth of Christ, the Maya count the days from a beginning

day that according to our system falls about 3600 B. C. Nearly all the Initial Series dates known occur at the southern cities of the Maya area but one very important date of this sort occurs at Chichen Itzá. Indeed it is this date which has made possible a correlation of the archaic Maya calendar with the calendar used in the Books of Chilan Balam.

But dates that are simply dates mean very little; to be of value they must be associated with events. Now while we can read the dates in Maya inscriptions, we can do very little with the remaining



Photo by F. M. Chapman
Temple of the Tables showing sculptured door jambs and stone figure used as altar support

hieroglyphs that probably tell the significance of these dates. A third line of research enables us however, to prove what dates are in all probability contemporaneous with the monument on which they are found and what dates refer to the past or future. Progressive changes in style of sculpture and progressive adaptation of superior mechanical devices in architecture enable us to arrange many works of art in their proper time sequence but do not, of course, enable us to express this time sequence in terms of years. Space does not permit a full explanation of this complicated subject which, however, the writer has elsewhere given in detail. Suffice it to say that by carefully coördinating the three lines of study just explained an outline of the course of Maya history is made possible. The following names and limits have been suggested for the various periods:

Protohistoric Period	235 B.C. to 160 A.D.
Archaic Period	160 A.D. to 455 A.D.
Great Period	455 A.D. to 600 A.D.
Transition Period	600 A.D. to 960 A.D.
League Period	960 A.D. to 1195 A.D.
Nahua Period	1195 A.D. to 1442 A.D.
Modern Period	1442 A.D. to ?

Now let us see what place Chichen Itzá occupies in this historical vista. Several of the chronicles relate that Chichen Itzá was discovered during a residence of the Itzá at Bacalar on the east coast of Yucatan. By the term "discovered" is probably meant that the cenotes which made habitation possible were discovered. The settlement was made

about 450 A.D. at a time when the southern cities, such as Copán and Tikal, were entering upon their most brilliant epoch. It seems certain, however, that Chichen Itzá was only a mediocre provincial town at this time. Only one dated stone has been found and this is poorly carved. The date upon it corresponds to 603 A.D. Shortly after this date Chichen Itzá was abandoned and the Itzá went to the land of Chanputun, near Campeche, where they stayed according to the chronicles, for two hundred and sixty years. Somewhere near the middle of the tenth century they made their way back to the north and reestablished Chichen Itzá. At about the same time Uxmal and Mayapan were likewise founded and a league between the three was instituted. This League of Mayapan, as it is commonly called, endured for over two hundred years and controlled the destinies of northern Yucatan. Trouble between the allies broke out with the Plot of Hunac Ceel, the chief of Mayapan, and as a result the hereditary ruler of Chichen Itzá, whose name was Chac Xib Chac, was driven out in 1176. A disastrous war lasting thirty-four years took place and the ruler of Mayapan seems to have enlisted seven warriors from the highlands of



Serpent heads, death heads and other sculptured figures lie scattered about in the brush, awaiting the careful study of the archaeologist and student of primitive art



Capitol of a rectangular column — lower chamber of the Temple of the Jaguars. The design shows a grotesque face surrounded by three human figures. The man at the top bears a head-dress of leaves and flowers and holds flowering branches in his hand



Sculptured column, Temple of the Tables. The use of square and round columns at Chichen Itzá, transforming the outer room of the temple into an open portico, is a great advance over the simple doorways of the earlier Maya buildings

Mexico under his standard. These men have Nahua names. In all probability the conquered city was given over to them as the spoils of war at the end of the long contest. After this however, there seems to have been little in the way of peace. Civil wars rent the land and while we cannot put an exact date on the final fall and abandonment of Chichen Itzá and Uxmal it is probable that these

events occurred somewhere in the fourteenth century. Mayapan, the last city to survive, fell in 1442, almost exactly a hundred years before the Spaniards made their first permanent settlement at Mérida.

When we try to arrange the buildings of Chichen Itzá in their proper order of erection, it is remarkable that so many of the finest structures clearly belong to this last short period when the city was in the hands of foreign rulers from the distant Mexican highlands. It is unlikely that a single structure of the first occupation of Chichen Itzá will be found in a good state of preservation. The stone with the early date that has already received comment is a lintel that was probably taken from an old building and is reused in a later one. There are, however, a number of structures that probably date from the second occupation when Chichen Itzá was a purely Maya center. The Akat'cib and the Casa Colorada are Maya structures without a trace of foreign influence. Most of the Monjas Group is also Maya without modification. The Castillo, the Temple of the High Priest's Grave, the

entire Group of the Ball Court and the Group of the Columns date in all probability from the foreign régime and consequently cannot have been erected before the last quarter of the twelfth century. The architecture of these buildings as well as the sculptures show strong resemblances to work in Tula, Teotihuacán and other sites in the valley of Mexico. The native religion seems to have suffered from the foreign infusion also. New forms appear in the religious art and it is not unlikely that the human sacrifice at the Sacred Cenote was inaugurated by the intruders. The game played in the Ball Court seems not to have been known by the Maya in earlier times, and indeed the only examples of ball courts in Yucatan are seen at Chichen Itzá and Uxmal.

This, in brief, is the story of Chichen Itzá.¹ Founded when the Huns under Attila were battling with the failing armies of Rome, it was abandoned for the first time when Mohammed was laying the leaven of Arab conquest. Reestablished in the era of the Saxon kings, it flourished during the Crusades and lost its freedom to a foreign power when our fathers were struggling for the Magna Charta, and sank into oblivion while the English and French fought out the Hundred Years' War. Surely a city with such a history can hardly be dismissed as void of interest and inspiration.

¹ For a more detailed account of this and other points in Maya history see a *Study of Maya Art* by Herbert J. Spinden in *Memoirs of the Peabody Museum of American Archaeology and Ethnology*. Harvard University, vol. VI, Cambridge, Mass., 1913



A human-like head in the distended mouth of a plumed monster. The claws of the monster are seen at the bottom and between them hangs the great forked tongue.



Sculptured column made of drum-shaped sections — South Temple of the Ball Court. The designs represent warriors, reclining figures and a wealth of highly conventionalized serpent heads



DETAIL OF THE BOWFIN GROUP

This photograph of a portion of the group shows the male bowfin poised over the nest guarding the eggs against intruders. [The eggs appear as white dots in the picture]

FISH EXHIBITS IN THE AMERICAN MUSEUM

By Bashford Dean

IT is an open question to what degree the life-habits of fishes should be pictured in an elaborate way in the Museum's present gallery of fishes, for space is limited and such "habitat groups" occupy many cubic feet. It is clear, too, that they are subsidiary to other types of exhibits, thus, the principal kinds of fishes must be shown as casts, alcoholic specimens or stuffed, and there must be models and preparations to illustrate how fishes move, breathe, and have their being generally, how they reproduce their kind, how they may be curiously adapted to living in shallows, surf, the depths of the sea, on land, and even flying in the air, how they change colors when they sleep, or when chameleon-like, they adjust themselves to their surroundings. All exhibits of the latter types may be developed attractively on a fairly small scale, and will interest and teach the average visitor to the Museum, and will satisfy as well a need of the serious reader of zoölogy.

Great habitat groups, on the other hand, are elaborate exhibits with painted backgrounds, artificial plants and rocks and "effects" which entail much time to construct, great expense, and infinite pains to supervise and execute. The results, it is true, are apt to give an impressive and accurate picture of certain phases in the life of fishes, and are certainly a definite and æsthetic means of attracting the visitor to a more careful study of neighboring exhibits, whetting his appetite for a more serious zoölogical diet, so to speak. Still, even at the best, the habitat groups of fishes are not to be compared with those of mammals, birds or reptiles, for fishes are least suited structurally to the art

of the taxidermist or of the modeler. Scales and fins shrink, colors fade, and the mounted fish, no matter what its pose, appears only too often as a dead fish, opaque and leaden. It follows therefore, that with our technical methods, extensive fish groups can hardly be expected to rival the tanks of an aquarium.

In our present gallery accordingly, it has been the aim to show larger habitat groups only in those instances where the fishes form important links in the chain of the backboneed animals, and touch the broader phases of natural history, especially from the viewpoints of structure and descent. In such cases too, the effort has been to demonstrate essential habits or interesting facts concerning their breeding or development. Thus, the lowly lampreys are represented in a group which shows such details as swimming, excavating their nest and depositing their eggs. And the ganoids are now pictured in four larger groups. For the ganoids are the few survivors of one of the great divisions of fishes in early geological times, and formed the evolutionary bridge which connected the primitive sharks on the one hand with lungfishes, and on the other with the bony fishes, which form perhaps over ninety-nine per cent of all living fishes. In these four habitat groups, the first pictures the shovel-nosed sturgeon, which still occurs in the Mississippi and its tributaries, and is to be regarded as the least modified of all living ganoids. The second shows the spoonbill sturgeon, which, on the contrary, is the most highly modified member of the ancient stock. This eccentric sturgeon has survived only in this country and in China,

and is here verging perceptibly toward



Portion of the transparent background of the bowfin group to show the painting of the male bowfin with the swarm of newly-hatched young

extinction, for its immature spawn is used as a caviar and our fishermen have devised means of well-nigh exterminating it. The third group exhibits the spawning habits of the gar pike, whose close-set armor of enamel plates suggests at once the bony- and glossy-scaled fossil fishes which one finds abundant from the age of the Old Red Sandstone onward. The fourth group shows a ganoid which has nearly attained the appearance and structure of a modern bony fish. This is the dogfish or bowfin, *Amia*, which though known fossil from many parts of the world, is practically restricted to-day to the waters of the Middle West.

The last three groups mentioned have lately been placed on exhibition. They are the work of Mr. Dwight Franklin, of the Museum's department of preparation, who collected the material and carried out its preparation with the greatest care. The plant-life accessories in the *Amia* group were executed by Mr. A. E. Butler, also of the Museum's staff, who had the advantage of visiting Mr. Franklin in the field. Mr. Franklin has prepared for the JOURNAL a note on his collecting experiences, and this is published in the present number.

It may be said that the department of ichthyology of the American Museum hopes to prepare at some time in the near future a similar habitat group to show the important division of fishes represented by the living sharks and rays, still another group to picture the life of the lungfishes, and several groups to represent the bony fishes — one showing the life habits of pelagic forms, another, which is now well in hand, will picture the "phosphorescent" fishes of the deep sea, and still another the fishes of rocks and surf and bright colored corals.



THE BOWFIN GROUP

To illustrate the nesting habits of the bowfin, or mudfish (*Ambloplites calva*). At the left the male and female fishes are seen spawning on a nest; at the right a male is seen standing guard over the eggs. The materials for the group were collected at Fowler Lake, Oconomowoc, Wisconsin, in May, 1912, by Messrs. Dwight Franklin and A. E. Butler of the department of preparation. The fishes were mounted by Mr. Franklin and the accessories were prepared by Mr. Butler. The transparent background was painted by Mr. Albert Operti



THE GAR PIKE GROUP

A party of gar (*Lepisosteus osseus*) just after spawning. At the right are seen the "weeds," among which the eggs (shown as white dots in the picture) were deposited. The studies for the group were made at Lake Nemahbin, Wisconsin, in June, 1912, by Messrs. Dwight Franklin and A. E. Butler, of the department of preparation. The fishes were mounted and colored in the field from living specimens, by Mr. Franklin

SOME FISH OF THE MIDDLE WEST

By Dwight Franklin

THREE months in the field in Wisconsin were necessary for collecting material for the new fish groups — the bowfin, gar pike and shovel-nosed sturgeon. Oconomowoc, Wisconsin, was chosen as the best place to observe both bowfin and gar pike. Professor Dean of the American Museum had suggested the locality, and it was he who brought me in touch with Dr. George Meyer, through whose kindness I was enabled to study both fishes at close range. With an old boathouse for a laboratory, I mounted and colored the fishes on the spot, working from live specimens. I also made many studies and sketches, including a number of color photographs taken on autochrome plates.

The male bowfin is about twenty inches in length, the female being a trifle larger. In their spawning it is an interesting fact that the male assumes nearly all the responsibilities which we generally associate with the female. During the fall and winter months he is dull in color like the female, but with the arrival of spring he appears in gorgeous colors: bronze back with black markings, vivid green fins and underside, and with a jet black spot ringed with orange near his tail-fin. He first builds a nest by clearing a space among the reeds in the shallows near the shores of the lake. The reeds are bitten off close to the mud, and the bottom is cleared until the depression is about six inches deep and two feet across. Sometimes the nest is built in the shelter of a half-sunken log, and not infrequently within a few feet of another nest. When it is completed the female enters and, with the male, swims around inside, laying

the thousands of eggs, no larger than bird shot, which attach themselves to the rootlets lining the bottom and sides of the hollow. Then she forsakes the nest, leaving it in charge of the male, who stands guard over the eggs, keeping off hungry intruders. After nine days the eggs have hatched into tiny black creatures much resembling frog tadpoles. They lie quietly in the nest for a few days more and then leave in a closely massed swarm, the size of a football, accompanied by the watchful male, who remains with them until midsummer when they are fingerlings and able to shift for themselves.

The gar pike's breeding habits are in striking contrast with those of the bowfin. In early June spawning parties of gar, composed of a large female and several small males, may be seen moving along through the open water near the lake shore. They swim in close formation, and wheel with soldierly precision. The eggs are dropped among the low weeds and the gars swim on, paying no further attention to them. Sometimes the eggs are devoured by other fishes, but the numbers of gars do not seem to diminish. In fact both bowfins and gars are so numerous in certain parts of the country that they are hated by the sportsman, both because they have the reputation of eating young game fish and because they are often hooked when the fisherman is after bass or pickerel. Neither seems to be used for food, as the gar's flesh is coarse and stringy, while that of the bowfin is mushy and flavorless. Both however are valiant fighters and are not readily landed.

When the material for the bowfin and gar groups was prepared, I visited

Prairie du Sac on the Wisconsin River, having heard from Dr. Graenicher, of the Milwaukee Museum, that shovel-nosed sturgeon could be collected there. Mr. Ochsner, a local naturalist, was of great assistance in securing a few specimens, but as this sturgeon was not caught there in any numbers, I found it necessary to move on to Prairie du Chien, on the Mississippi River, where the shovel-nose is abundant. The game warden there, Mr. Klofanda, put me in

touch with Mr. Elwell of MacGregor, Iowa, a little city on the opposite side of the river. Mr. Elwell receives quantities of shovel-nose, or "hackleback," as they are locally called, and through him I was able to obtain all specimens needed, as well as a good series of local fishes and much interesting data.

The shovel-nose is one of our smallest sturgeons, averaging only two feet in length and about two pounds in weight. The snout is flat and broad, and the tail-

fin tapers to a whip, the purpose of which is not clearly understood. Bottom-loving fish, they glide through the muddy water, sucking up fly larvæ and other small organisms which lie on the river bed or they collect in the crevices of sunken snags. As they swim upstream in schools, they are caught in the trammel nets of the fisherman, who frequently averages two hundred and fifty pounds per day, and who fishes from spring until early winter with the exception of the month of August, when few sturgeon are taken. The flesh is smoked and sold at five cents a pound, while the eggs are made into caviar and shipped east. Eighteen hundred pounds of caviar is the average yearly shipment, although as high as thirty-eight hundred pounds have been shipped in one year.



The bowfin nests among the cat-tails in the shallow water of the marshes



Catch of shovel-nosed sturgeon, or "hackleback," dressed and ready for market

THE BLIND IN THE AMERICAN MUSEUM

By Agnes Laidlaw Vaughan

THE work with the blind in the American Museum began in 1909. Several members of the Museum staff had given lectures on natural history to clubs and gatherings of blind people and had been granted permission to use some of the Museum material for illustration. The experience was so interesting that it suggested to Dr. Hermon C. Bumpus, then director of the Museum, the possibility of special work for the blind in the Museum, and the trustees authorized the preparation of a room to contain collections of interest to blind visitors.

Casual blind visitors to the Museum are rare however, and after testing for two years the practicality of a special exhibit, we decided to remove it and make an arrangement whereby the instructors could meet blind visitors and show them specimens in the exhibition halls. In many instances the specimens were taken out of the cases for examination, and where this was not possible, as in many of the ethnographical exhibits, the visitors were taken to the storage study collections.

The *Ziegler Blind Magazine*, through the courtesy of its editor, Mr. Walter Holmes, published notices of the welcome extended to blind visitors and of the facilities for seeing the collections. The information was sent also to the Public Library for the Blind, to the public schools, and to all the institutions for the blind in or near New York. The response was slight as regards numbers but large in enthusiasm, and the comments of the visitors were often amusing as well as stimulating. One of a group of young women "seeing" a hippopotamus called, "My! Annie, just come here. This is the *homeliest* beast you ever saw! Why, he's a block long!" Another woman remarked, "I lost my sight when I was sixteen and I remember lots of things, but I never noticed till now that the knee of the ostrich was way up like this. I think seeing people don't half use their eyes." One recalls this last comment frequently when showing objects to the blind, and notes the concentration and observation of detail which are often closer in them than in the sighted visitor.

During the first year the work with the blind was experimental and more or less

spasmodic. In 1910 however, its development and extension were made possible through the bequest of Phebe Anna Thorne, and gifts in her name by her brothers, Jonathan and Samuel Thorne. This generous endowment, known as the Jonathan Thorne Memorial Fund, provides a fixed income which enables the Museum to supply transportation for the blind and their guides to and from the Museum; to send loan collections to schools in the vicinity of New York; and to give illustrated lectures in the Museum to school children and to the adult blind.

The subjects of these lectures have included several on natural history and ethnology. One on ancient Peru consisted partly of readings from Prescott's *Peru*. The audience was deeply interested to learn that Prescott was blind when he wrote this famous book. Among the objects illustrating this lecture were some fine examples of Peruvian pottery. These were later reproduced in clay by one of the blind girls. A talk on the songs of North American Indians was illustrated by unique phonograph records taken among the Dakota, Blackfoot and other tribes, and by musical instruments and other related objects.

In the audience was a striking group consisting of a class of blind-deaf from an institution for the deaf. There were five pupils, two of whom could hear if they sat directly in front of the speaker, accompanied by two teachers, one deaf and one normal. The latter interpreted the lecture by finger language on the hand of one pupil and by lip movement, aided by the fingers of her free hand, to the other teacher, who passed on the words by means of her fingers to the other two girls. All of these blind-deaf had been taught to speak and they asked many intelligent questions during the course of the discussion and "finger-view" of the objects.

This year the plans for thorough organization have matured. We are now engaged in making a census of all the blind people in and near New York City, for which a mailing list will be prepared with the assistance of the New York Association for the Blind and the New Jersey State Commission. A letter has been sent to each person on this list, enclosing a post card to be filled out and returned.

The data relates to the occupation and hours of work, whether the person is able to attend afternoon or evening lectures; topics of especial interest; and ability to secure guidance. This file will enable us to communicate directly with the blind people, and to get an idea of the topics that will be useful to them.

Two or three evening lectures will be given by notable persons, by explorers and scientists. Admiral Peary has consented to be the first speaker. The audience will pass from his lecture to an examination of relief charts, of the sledge that reached the North Pole, of fur clothing, Eskimo implements and Arctic animals, including the Peary caribou, the most northern of the deer family. The afternoon lectures, of a more informal character, will describe the Panama Canal, life and work among primitive people, and how animals care for their young. The blind children in the public schools have been coming to the Museum for informal talks on natural history and other subjects, such as stories told to Indian and Eskimo children; man and his tools — from the river pebble to machinery.

One talk had as its theme, "the struggle for existence" of the mouse, although we called it "Meadow Mice and their Enemies." A mounted specimen of a meadow mouse was passed from hand to hand and we talked about the details of its appearance, its size, teeth and its likeness to other rodents. The meadow mouse destroys the farmer's crops and the farmer kills the mouse whenever he can. Whatever creature feeds upon the mouse is, in so far, the farmer's friend. We "saw" the creatures of the air that prey upon the mouse — the hawk and the owl; the enemies that hunt it in the grass — the cat, skunk, weasel, the silent snake; and learned how each one hunts its prey. To understand how the mouse manages to exist with such a host of enemies, we described its home in the grass, its habits, the young mice and the number of families a mouse-pair can raise in a season. And thus the hour had passed before a single child was ready to go.

The objects lent to the schools for the blind include the regular school collections and ethnographical specimens selected according to the request of the teachers. Indian or Eskimo clothing, implements and toys arouse such interest that several of the blind children write letters to the Museum during the school

year to express their pleasure in the collections. The material is selected outside of its interest value, with regard to form, use and durability under use, although the care exercised by the teachers is effective in keeping the objects intact.

Suggestions for related reading often accompany the loan. These collections or things "seen" at the Museum are made the subjects of compositions, which are occasionally sent us by the teachers. Quotations from these essays show the observation and memory of the children, and their facility of expression:

Would you like to know what an idea the camel impressed upon my mind? His head is small in proportion to the rest of its body, his legs are long and its feet are flat so that he can walk over the sand without sinking.....

The hippopotamus is a very short fat animal. He has a big fat head and tiny little ears on the top of his head. His eyes are very small and are on the upper part of his head so he can stick his head out of the water and see what is going on..... His mouth is very big. It is like a half-circle. The corners of his mouth turn up and almost meet his eyes and make you think he is laughing.....

Another child writes of the hippopotamus, "He is so fat that he has a big *rinkle* in his neck." The spelling however is remarkably good for children, *rinkle* being the only mistake in half a dozen compositions.

For the blind children the visits to the Museum will be recognized from now on as part of their school work and will be made during school hours. There are more than one hundred blind children in the elementary schools, too many to deal with satisfactorily at one time. One-half of the classes will come to the Museum on the second Tuesday and the other half on the fourth Tuesday of the month. The same lecture will be repeated, and will be given a third time to classes from Jersey City and Newark.

In addition to natural history specimens and ethnographical material lent to the schools, we have prepared several small models of large mammals. There has been a good deal of discussion on the use of small models with blind children, and in Mr. J. A. Charlton Deas's admirable paper on the "Showing of Museums and Art Galleries to the Blind," in a recent number of the *Museums Journal* of Great Britain, he and his associates deprecate the use of small models of animals. I took his arguments to some trained workers

or the blind, with a wide experience, and we carried the discussion further than it had gone in England, and agreed that the small model should not be used alone, but that it is valuable as supplementary to the examination of life-size mounted specimens of large mammals.

The child forms a better conception of the animal as a whole, and of the proportion of its parts from the model which he can hold in his hands. His adjustment to the conception of size may be trained, as is that of the sighted child when regarding maps, pictures or toys. The danger however of the first impression fixing an erroneous conception of size and texture is perhaps greater for the blind than for the normal child whose adjustments are more rapid and constant. We propose therefore, both the life-size mount and the small model. The child shall first feel the actual specimen, shall realize that it is large, hairy and so forth; then he shall take the model and study the appearance of the animal as a whole, and gain a more definite conception of its proportions. He may then study the mounted animal in detail.

The blind children of the city are pitifully lacking in "background." The most common objects are unknown to them; teachers find that the appearance of domestic animals, except perhaps the cat or dog, is outside of their knowledge. The visit to the Museum means more than an hour's instruction, more than the mere viewing of new objects, it means a change of environment, a stimulation of intellectual expression, the appreciation of the socializing forces which go to pro-

duce public institutions for the distribution of knowledge and the betterment of life.

A blind man epitomized the labor and purpose of science when he laid his hand on the enormous meteorite "Ahnighito" brought from far Greenland, and exclaimed, "And they took all that trouble to bring this big thing down here so we'd know there are such things."



The work with the blind was made possible through the bequest of Phebe Anna Thorne and gifts in her name by her brothers, Jonathan and Samuel Thorne



A NEW EXPERIENCE FOR SIGHTLESS CHILDREN

The American Museum furnishes an instructor for classes of blind children who are allowed to "see" with their hands the many interesting animals they read and talk about

MUSEUM NOTES

SINCE the last issue of the JOURNAL the following persons have been elected to membership in the Museum:

Life Members, MESSRS. S. C. PIRIE, CHARLES T. RAMSDEN and CHARLES B. WEBSTER;

Sustaining Members, DR. EDWIN BEER and MR. HAROLD C. WHITMAN;

Annual Members, MRS. ALBERT WINSTEN, MISSES HELEN LOUISE JOHNSON, MARGUERITE T. LEE, CAROLINE LEXOW and CHRISTINA MUENDEL and MESSRS. CLINTON G. ABBOTT, ANDREW K. ACKERMAN, WILLIAM C. ANDERSON, ALFRED L. BAKER, S. HINMAN BIRD, M. C. BOUVIER, OSCAR FALK, H. LLOYD FOLSOM, E. HOWARD-MARTIN, LOUIS M. JOSEPHthal, REID A. KATHAN, EDWARD V. KILLEEN, J. M. KLEIN, EBEN B. KNOWLTON, JOHN G. LIVINGSTON, DANIEL ALDEN LORING, JR., ROBERT EDGAR McALLISTER, IRVING E. RAYMOND, AUGUST SARIL, GUSTAVE H. SCHIFF, MAX SCHLING, DAVID SCHWAB, ROBERT R. SIZER, FRED STERNBERG, JULIUS STERNFELD, JOHN FRANCIS STRAUSS, MAURICE J. STRAUSS, H. M. SWETLAND, T. B. WAGNER, MILTON H. WALLENSTEIN, LEO WALLERSTEIN, WILLIAM DE H. WASHINGTON, JOHN CALDWELL WELWOOD and JACOB WERTHEIM.

A CONFERENCE on the Piltdown skull and the origin of man was held by the Section of Biology, New York Academy of Sciences on January 12. Professor Osborn reviewed the succession of the early human types showing their relations to the alternating advances and retreats of the great continental glacier in Europe. Dr. J. Leon Williams then summarized the present knowledge of the already famous Piltdown skull. He was inclined to side with Professor Keith's reconstruction of the skull, which implies a high brain volume. Dr. Robert Broom on the other hand defended Smith Woodward's reconstruction which assigns a low brain volume to this very old type. The discussion brought out the fact that the lower jaw found with this skull is more like that of an orang-utan, while the skull fragments are typically human. Dr. W. K. Gregory gave a series of views showing the base of the cranium in various families of Primates including man. He emphasized the idea that whether the Piltdown man had a large brain or a small brain the evidence for

man's relationship with the old world monkeys and apes was long since made conclusive and new lines of evidence are continually coming to light. He showed that the detailed characters at the base of the skull in man agree fundamentally with those of the Old World Primates.

Dr. Williams' interesting collection of casts of human and prehuman skulls were exhibited. This collection brings together casts of all the famous fossil skulls of Europe and illustrates the stages leading from the apelike *Pithecanthropus* through the Neanderthal stage with low brows and retreating forehead and sloping chin up to the Cro-Magnon or low palaeolithic stage with highly developed brain case and well-formed chin. This collection will be on view for a short time in the hall of fossil mammals.

MR. and MRS. PAUL J. SACHS have established a fund to be known officially as the Angelo Heilprin Exploring Fund. The money is given in memory of Angelo Heilprin and is to be applied each year to any exploring purpose the Museum authorities deem fitting.

DR. CLARK WISSLER, curator of the department of anthropology, was elected vice-president of Section H of the American Association for the Advancement of Science at the Atlanta meeting in December.

PROFESSOR HENRY FAIRFIELD OSBORN will deliver the Hitchcock lectures at the University of California from February 16 to 20 inclusive. The subject of the series will be the "Antiquity of Man."

MR. CHARLES R. KNIGHT will hold during the month of February, a special exhibition of his work in the west assembly hall of the Museum. The sculptures and paintings exhibited will include not only examples of his restorations of extinct animals and designs for mural decorations for the hall of fossil vertebrates in the Museum, but also many representative illustrations of his work as a sculptor and painter of modern animals. Various bronzes and canvases belonging to Mrs. J. P. Morgan, Mrs. E. H. Harriman, Prof. Henry Fairfield Osborn and others have been especially loaned for the exhibit.

THE attendance at the Museum during 1913 exceeded by 19,000 the attendance of the previous year. 

DR. ROBERT BROOM, as has been announced in previous numbers of the JOURNAL, has been spending some months at the American Museum for the purpose of studying and comparing the ancient Permian reptiles of South Africa and the United States. The results of his work published in the Museum *Bulletin* and more briefly noticed in the JOURNAL, form an important addition to scientific knowledge of these animals. His splendid private collection has been purchased for the Museum and will when completely prepared and mounted afford an exhibit of these ancient and peculiar reptiles, no less remarkable and instructive than the Texas Permian collections of which the Museum has been justly proud. A preliminary exhibit of a few selected specimens from the Broom collection has been placed on exhibition in the case opposite the elevator, on the fourth floor.

DR. ROBERT BROOM will sail for Scotland on January 24. In the work that he has been doing in America reference may be made to his redescription of the pectoral fin of *Sauripteris taylori*. This was a specimen that belonged to the Hall collection and was originally described in 1843. He points out that it throws new light on the origin of the five-fingered limb from the fish's fin. Also he has made a study of a number of the American Permian reptiles and has at present in press a paper in which he points out the affinities of these early American types with the South African.

MR. WALTER GRANGER as a result of his expedition to New Mexico last summer brought to the Museum a finely preserved skull of *Polymastodon* discovered by Dr. W. J. Sinclair of Princeton. This is one of the "Multituberculates," mammals found chiefly in the ancient formations of the Age of Reptiles. Very little of these animals has been known except for the jaws and teeth and their relationship has been much disputed. With the additional evidence furnished by this specimen, the conclusion is given by Dr. Robert Broom, who has described it, that they are related to the Monotremes or egg-laying mammals of Australia and New Guinea, which are perhaps

their degenerate descendants. *Polymastodon* was originally described by Cope and the type specimens are in the American Museum. It was at first thought to be allied to the marsupial group. Later Cope suggested its affinities with egg-laying mammals of Australia. Still later scientific opinion swung back to the old idea that it was marsupial. This new skull shows conclusively that it is not at all allied to the marsupials but that in confirmation of Cope's views and of those long held by Dr. Broom, it is probably fairly nearly allied to the egg-laying mammals.

THE lectures on "Heredity and Sex" delivered in the spring of 1913 as the Jesup Lectures at the American Museum of Natural History by Thomas Hunt Morgan, Ph.D., professor of experimental zoölogy at Columbia University, have recently appeared in book form from the Columbia University Press.

THE installation of the Alaskan moose at the entrance to the hall of North American mammals places this magnificent animal, the giant of the deer family, in an appropriate position, where it forms a fitting introduction to the fauna of North America. It also displays the light, metal-framed case at its best, showing how great size may be combined with extreme lightness. The case, measuring 6 x 10 x 10 feet, is one of the largest of its kind that ever has been constructed, yet its frame of bronze is only seven-eighths of an inch in width. This style of case is indeed admirably adapted for the display of large single specimens, there being just enough frame to individualize the object—as a line around the title of a pamphlet gives it character. Perhaps for wall cases however and for large open groups a wooden case, or at least one with a fairly heavy frame, is better, giving the objects the appearance of being better protected or shut off from the surrounding objects of the hall.

AT the meetings of the American Anthropological Association held at the Museum from December 29 to 31 the following papers were read by members of the Museum's staff: "The Horse and the Plains Culture," Dr. Clark Wissler; "Wayside Shrines in Northwestern California," Dr. P. E. Goddard, also "Is there Evidence, other than Linguistic, of Relationship between the Northern



AT ENTRANCE TO HALL OF NORTH AMERICAN MAMMALS

The moose was mounted in 1902 by Mr. Ernest Smith. The new case in which it is at present exhibited is the largest metal case with sides of a single piece of glass ever constructed. The case measures about 10 by 6 feet with a height of 10 feet. The bindings are made of extruded metal, not rolled like steel nor forged like iron but extruded by hydraulic pressure through a die which forms the bottom of a crucible. The sections are held together by clasps and the whole can be taken apart and reassembled in very short time. The case is absolutely dustproof

and Southern Athapascans?" by Dr. Goddard; "Phratries, Clans, Moieties," Dr. Robert H. Lowie; "The Social, Political and Religious Organization of the Tewa," Dr. H. J. Spinden; "The Cultural Position of the Plains Ojibway," Mr. Alanson Skinner; "The Crow Sun Dance," Dr. Robert H. Lowie; "Home Songs of the Tewa Indians," Dr. H. J. Spinden; "Some Aspects of the Folklore of the Central Algonkin," Mr. Alanson Skinner.

AMONG the noted anthropologists who attended the meetings of the American Anthropological Association at the Museum in December were Professor Roland B. Dixon of Harvard, Dr. Berthold Laufer of the Field Museum, Chicago, Professor Hiram Bingham and Professor George Grant MacCurdy of Yale University, and Dr. John R. Swanton, Dr. T. Michelson, Dr. William H. Holmes, Dr. Walter Hough and Dr. A. Hrdlicka of Washington.

DR. E. O. HOVEY and DR. CHESTER A. REEDS represented the department of geology at the annual meetings of the Geological Society of America and the Palæontological Society which were held at Princeton University in December.

At the December meeting of the Section of Biology, New York Academy of Sciences, Professor Henry Fairfield Osborn led a discussion on unit characters as they appear to the palæontologist. His researches on the extinct Titanotheres and on the recent and extinct horses had revealed two kinds of characters: first, allometrons, progressive changes of proportion occurring through long periods, resulting for example in very long skulls or very broad skulls or in the lengthening of one part as compared with another; second, rectigradations, characters which appear in an almost invisible degree as new characters, such as the additional cusps which develop in the molar teeth of herbivorous animals; these characters generally advance steadily toward a culminating or extreme form. These he thought possibly of the same nature as unit characters of the experimentalist and inherited according to the Mendelian ratio. A discussion followed in which Professors Morgan, Broom, Davenport and Osborn took part.

DR. E. O. HOVEY and DR. G. CLYDE FISHER were the delegates representing the Museum in Albany at the inauguration of Dr. John H. Finley as president of the University of the State of New York and State Commissioner of Education.

THROUGH Dr. Ambrosetti the American Museum has acquired a very considerable archaeological collection from Argentina, representing the ancient culture known as Calchaquí or Diaguita-Calchaquí. The collection comes from two localities. That from the valley of Santa Maria, Province of Catamarca, contains about fifty pieces of pottery including six of the large and beautiful burial jars characteristic of that region. The balance is from ruins on the island of Tilcara, Province of Jujuy, and consists of pottery vessels and many implements of stone and bone. The collection comes as an exchange with the Museo Ethnografico de la Facultad de Filosofia y Letras of Buenos Aires.

DR. JOHN C. MERRIAM, head of the department of palæontology of the University of California, visited the Museum during January for the purpose of comparative study of some of our fossil vertebrate collections.

Dr. Merriam has forwarded to the Museum a valuable installment of the series of skulls and skeletons from the asphalt deposits of Rancho-la-Brea, near Los Angeles, which we are to receive in exchange from the University of California. The first installments received some time ago have enabled us to illustrate in the "asphalt group" the extraordinary manner in which these animals came to be preserved as fossils. The present installment is intended for the series showing the various kinds of animals (all extinct species) preserved. It consists of complete skeletons of the great wolf (*Canis dirus*) and sabre-tooth tiger (*Smilodon californicus*) and skulls of the lion (*Felix atrox* var. *bebbi*) and horse (*Equus occidentalis*). The wolf is notably larger than the largest living timber wolves to which it is nearly related. The sabre-tooth tiger, one of the most remarkable of all extinct beasts of prey, is considerably smaller than the great Pampean species of South America, but equals the existing lions and tigers in size, although very different in appearance and habits. It was especially adapted to prey upon large powerful and thick-skinned beasts, using its great dagger-tusks to pierce through

their thick hides and protecting coats of hair. The lion is closely related to the lions and tigers of to-day, but of much larger size, comparing in this particular with the great brown bears of Alaska, the largest living Carnivora. It seems to have been much like the modern lion in appearance and habits, although it is not known whether it had a mane. The horse is also a near relative of the living species and about as large as an average domestic carriage horse.

This gigantic extinct lion is comparatively rare among the asphalt fossils and the horse is not very common. The selection of these fine specimens for our collections by the University of California is therefore very highly appreciated. The skulls and skeletons are among the finest of their kind that have been secured from the La Brea deposits.

A WIRELESS receiving set has been secured and is now being used daily at the Museum for getting the noontime signal from the Naval Observatory at Washington through the great radio station at Arlington.

ON January 26 Mr. Fay-Cooper Cole will give an illustrated lecture on "The Wild Tribes of Mindanao" before the American Ethnological Society and the Section of Anthropology and Psychology of the New York Academy of Sciences.

ALTHOUGH the Museum through its public lectures reaches a large number of people, it does not perhaps reach in this way the students who are in search of more technical knowledge in those fields which do not lend themselves readily to popular presentation and illustration by lantern slides. To those students the Museum opens its library, its study collections, its exhibition halls and renders assistance by guide leaflets, handbooks and scientific writings but in order to be of more service a course of lectures which are not illustrated and which are intended for those especially interested along the lines of social organization of primitive people has been arranged. On January 8 and 15, Dr. Robert H. Lowie will speak on "Social Organization"; on January 22, Dr. Pliny E. Goddard will speak on "Religious Observances" and on January 29, on "Religious Beliefs."

THE American Museum of Natural History and the American Scenic and Historic

Preservation Society announce a lecture to be given January 14 at the Museum by Dr. Douglas Wilson Johnson on "The Scenery of the Atlantic Coast and its Answer to the Question: Is the Coast Sinking?"

ON January 27 in the east assembly hall of the Museum, Mr. Alanson Skinner will speak before the Linnæan Society of New York on the Cree and Ojibway Indians of Saskatchewan. Mr. Skinner visited these tribes in 1913 securing valuable information along the lines of folklore and material culture.

SEVERAL interesting fishes have recently been mounted in the Museum laboratories by Mr. Thomas Bleakney, and placed on exhibition in the systematic collection. Among these is a peculiar spotted South American catfish with much flattened head and very long barbels (*Brachyplatystoma filamentosum*). South America is the home of many different catfishes. Some have the appearance of the whiskered horned pout of North America; others are variously encased in coats of mail, while still others are especially adapted to clinging to the beds of swift mountain torrents. Another abundant South American family, the Characins, is in some respects intermediate between catfish and carp, but the typical representatives look and act more like large-scaled trout. *Erythrinus erythrinus* is an *Amia*-like Characin which has recently been placed on exhibition, as has also *Sternarchorhynchus curvirostris*, with elephant-like snout or trunk. This latter species belongs to an allied group of eel-like fishes. Two specimens of the swellfish common in salt water near New York, have likewise been prepared. One shows the fish in its normal condition, the other as it appears after having inflated itself, a strange habit doubtless useful in intimidating its enemies.

ADDITIONS and rearrangements now under way will notably increase the interest of the exhibit of South American extinct mammals (fourth floor, south pavilion). To the ground sloth group is added a fifth skeleton of *Scelidotherium*, the long-skulled ground sloth. It differs from the more common *Myodon* in that the head is long and narrow, probably prolonged in life into a slender snout as in the modern anteaters, while the body is peculiarly short and almost globular. The new glypto-

dont group shows three of these so-called tortoise-armadillos. The largest and most complete is the *Panochthus* of Argentina, of which the carapace, head and tail have heretofore been on exhibition in a separate case. The limbs and feet are now placed in position and add to the oddity of its make-up. The massive powerful hind legs support the main weight of the body. The fore limbs show that the animal walked upon the tips of the claws like the little modern armadillos, instead of resting upon the sole of the forefoot, as one might expect in a beast so massively proportioned. A remarkably perfect carapace found in Mexico two years ago by Mr. Barnum Brown, is now exhibited for the first time. The third and smallest glyptodont is from northern Texas, found by Mr. J. W. Gidley in 1901, and has been on exhibition separately in a case.

This wonderful extinct fauna, so different from those of the rest of the world, is further illustrated by the magnificent sabre-tooth tiger skeleton, the casts of skeletons of *Toxodon*, *Macrauchenia* and *Hippidium* (the last to be transferred from the horse evolution alcove) and a large series of skeletons, skulls, limbs, etc. of the various extinct animals characteristic of South America already emplaced or in preparation for the walls and table cases.

THE recent acquisition by the New York Aquarium of a lobster weighing twenty-one pounds calls to our attention the fact that the American Museum has the largest known mounted specimens of lobsters in the world, one weighing when caught thirty-four pounds and the other thirty-one. Both were caught off Atlantic Highlands, New Jersey, in 1897. Although they are abnormal as to size, they seem to be perfectly normal in every other way, their proportions being not at all out of the ordinary. The specimens are exhibited in the Darwin hall of the department of invertebrate zoölogy.

MR. JOHN D. CRIMMINS has recently presented to the Museum a large mounted specimen of the rare silver-fish *Hynniscubensis* taken at Palm Beach, Florida, in February, 1913.

DR. C-E. A. WINSLOW delivered the presidential address before the Society of American Bacteriologists in Montreal, Canada,

January 1, 1914, on the "Characterization and Classification of Bacterial Types." Dr. Winslow together with Prof. J. G. Adami of Montreal and Prof. E. O. Jordan of Chicago have been appointed members of an International Commission on the Classification of Bacteria, which is now being organized. It is hoped that the American Museum collection of living bacteria will prove of peculiar value in the work of this commission.

THE following lectures to take place on Thursday evenings at 8:15 have been arranged for the Members' course: February 5, "Among the Wild Tribes of the Philippine Islands," Dean C. Worcester; February 19, "Seals and Other Animals of the Pribilof Islands," Frederic A. Lucas and Roy C. Andrews; February 26, "Fertile Argentina and its Vast Patagonian Pampas," Charles W. Furlong; March 5, "The Ascent of Denali (Mount McKinley)," Archdeacon Stuck; March 12, "Mexico and Her People," Frederick I. Monsen.

THE children's course of lectures open to all school children who are accompanied by their teachers and to children of members on the presentation of a membership ticket has been arranged as follows: March 2, "The Coming of Columbus," Agnes L. Vaughan; March 4, "Geography of the United States," G. Clyde Fisher; March 6, "The Panama Canal," Agnes L. Vaughan; March 9, "Exploration of the West," Agnes L. Vaughan; March 11, "River Highways," G. Clyde Fisher; March 13, "Glimpses of South America," Charles H. Rogers; March 16, "Settlement of New England," Roy W. Miner; March 18, "The Mountains," Albert E. Butler; March 20, "Scenes in Asia," G. Clyde Fisher; March 23, "Inside the Indian's Wigwam," Alanson Skinner; March 25, "The Great Plains," G. Clyde Fisher; March 27, "A Summer Trip to Europe," Agnes L. Vaughan; March 30, "Early History of New York," Roy W. Miner; April 1, "Our Great Northern Territory," Agnes L. Vaughan; April 17, "African Desert and Jungle," G. Clyde Fisher; April 20, "New York City To-day," Roy W. Miner; April 22, "The Forests of Our Country," George H. Sherwood; April 24, "Mexico and Central America," Charles H. Rogers. The hour of the lectures is four o'clock.



THE AMERICAN MUSEUM JOURNAL



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The Museum is open free to the public on every day in the year.

The American Museum of Natural History was established in 1869 to promote the Natural Sciences and to diffuse a general knowledge of them among the people, and it is in cordial coöperation with all similar institutions throughout the world. The Museum authorities are dependent upon private subscriptions and the dues from members for procuring needed additions to the collections and for carrying on explorations in America and other parts of the world. The membership fees are,

Annual Members.....	\$ 10	Fellows.....	\$ 500
Sustaining Members (Annual).....	25	Patrons.....	1000
Life Members.....	100	Associate Benefactors.....	10,000
Benefactors (gift or bequest)		\$50,000	

The Museum Library contains more than 60,000 volumes with a good working collection of publications issued by scientific institutions and societies in this country and abroad. The library is open to the public for reference daily — Sundays and holidays excepted — from 9 A. M. to 5 P. M.

The Museum Publications are issued in six series: *Memoirs*, *Bulletin*, *Anthropological Papers*, *American Museum Journal*, *Guide Leaflets* and *Annual Report*. Information concerning their sale may be obtained at the Museum library.

Guides for Study of Exhibits are provided on request by the department of public education. Teachers wishing to bring classes should write or telephone the department for an appointment, specifying the collection to be studied. Lectures to classes may also be arranged for. In all cases the best results are obtained with small groups of children.

Workrooms and Storage Collections may be visited by persons presenting membership tickets. The storage collections are open to all persons desiring to examine specimens for special study. Applications should be made at the information desk.

The Mitla Restaurant in the east basement is reached by the elevator and is open from 12 to 5 on all days except Sundays. Afternoon Tea is served from 2 to 5. The Mitla room is of unusual interest as an exhibition hall being an exact reproduction of temple ruins at Mitla, Mexico.

THE AMERICAN MUSEUM JOURNAL

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Half tone showing portion of canvas by Charles R. Knight

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FISHES OF A CORAL REEF
In the Museum of the Brooklyn Institute of Arts and Sciences. By Mr. Alfred J. Klein, 1907

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THE STORY OF MUSEUM GROUPS.

Part II

By Frederic A. Lucas

ONCE admitted into museums, a precedent established, and entrenched behind the bulwarks of high scientific authority, groups slowly found their way into all museums and their scope extended to all branches of natural history as fast as opportunity offered and the skill of the preparator would permit. Birds lend themselves more readily to groups than does any other class of animals; they combine beauty of form, pose and color with moderate size that permits ease of handling. Hence birds naturally were chosen for the first museum groups and bird groups still predominate.

Just as naturally mammals followed birds and from mice to elephants have furnished many notable groups and many triumphs — and failures — for the taxidermist. After mammals came anything that the taxidermist or modeler could master—reptiles, fishes, insects and other invertebrates, and last of all plants, which copied by modern methods are ever green and may be made to show their adaptations to environment and interrelations to varying conditions of soil, climate and surroundings.

Yea, the group idea has even been carried into the dim and distant past and in the hall of fossils one may behold a ghostly group of great ground sloths,

or farther on, *Allosaurus* feeding upon *Brontosaurus*. And the ground sloths passed out of existence thousands of years ago and *Allosaurus* has not felt the pangs of hunger for over six million years!

Fishes offer some of the most difficult problems; not only does their expression depend almost entirely upon their attitudes, but in many cases there is little of interest in their habits or small beauty in their surroundings, when they have any. And added to all these things is the ever present difficulty of making a fish suspended in air look as though he were swimming in water. Furthermore in the character of their integument, fishes and amphibians furnish a practically insurmountable problem in the way of mounting, which has led to much friendly discussion as to whether it is better to show a stuffed specimen that does not at all resemble the living animal or a cast that cannot be distinguished from it.

In this instance the writer is entirely on the side of those who offer "something just as good," believing firmly that the object of exhibits is to hold the mirror up to nature and let it reflect an image of nature as she looks when alive, not as she appears when dead and shriveled. And if a cloth leaf and a glass eye are

allowable, why not a wax frog and a celluloid fish?

One of the first efforts in the line of fish groups, that by Mr. Alfred J. Klein in the Brooklyn Museum, showing the fishes of a coral reef, is one of the best, partly from the nature of the subject, which affords more scope for attractive surroundings than is usually presented. And while the credit for this group, prepared in 1907, is entirely due to Mr. Klein, yet it really dates from a memorandum written in 1893 after an interview with Dr. Goode, "make a group of red snappers with natural surroundings." It embodies principles, carried to great perfection in the habitat groups, that

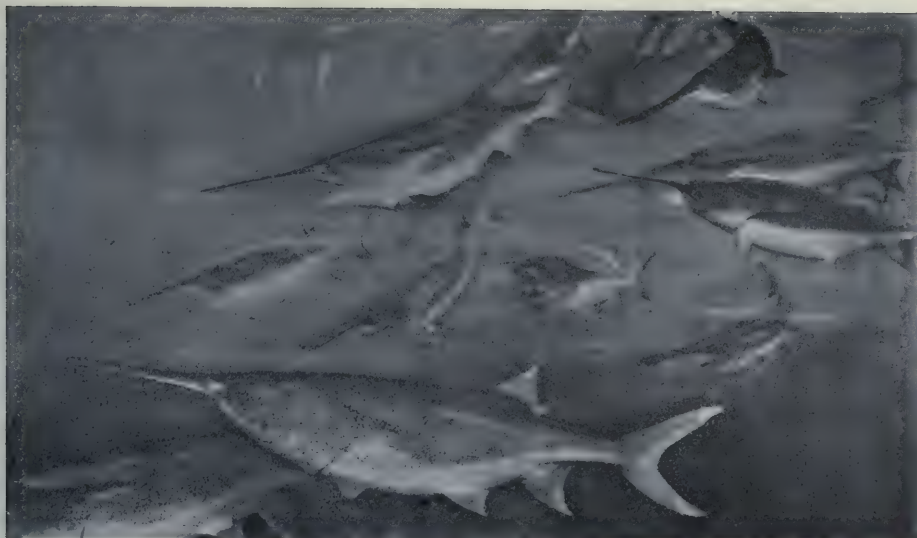
were independently worked out in the construction of a group of octopus, forming part of the exhibit of the United States National Museum at the Chicago Exposition of 1893. Painted background connected with the foreground, rounded corners and overhead lighting were all used in this small group, and while in comparison with what has been done since, it now seems a very crude little affair, yet it contained the germs of the beautiful Orizaba group.

The curved, panoramic background and overhead lighting — borrowed consciously or unconsciously from our cycloramas — permit the last touches in the way of illusion and control of light



THE WHARF-PILE GROUP

A new marine group in the American Museum made by Mr. I. Matausch and other preparators under the supervision of Mr. Roy W. Miner. It shows the sponges, hydroids, sea anemones and other invertebrate animals with which wharf piles in favored localities are crowded below low-water mark



Portion of the paddlefish group in the American Museum of Natural History

regardless of the time of day. The octopus group embodied also another idea, brought to great perfection here by Miss Mary C. Dickerson, that of making a single mold serve for making many individuals. In the octopus group the

animals were cast in gelatin compound and bent into diverse attitudes; to-day casts are made in wax, warmed and worked into many poses; a case of the parallel development that occurs in methods as well as in nature.



OCTOPUS GROUP

This group was prepared by Dr. F. A. Lucas for the Chicago Exposition of 1893 and is at present in the United States National Museum. The animals were modeled in clay and cast in "cathcartine," a mixture of glue and gelatin

The first bird groups, those in the British Museum and those here, were, if we may borrow a phrase once familiar, now almost obsolete, pre-Raphaelistic in their character—exact copies of the spot or surroundings where the animals were taken. The plants were counted and plotted on a diagram; sod, roots and shrubs were dug up and transported, often in the face of great difficulties, to the museum where the group was to be established, and there assembled in the

exact and proper order of occurrence. The next step was the habitat group and here is where Dr. Frank M. Chapman comes into the story, for it is to him that we owe the series of nature pictures known by that name.

The habitat group does not copy nature slavishly, even though an actual scene forms the background; it aims to give a broad and graphic presentation of the conditions under which certain assemblages of bird life are found, to



VIRGINIA DEER IN THE AMERICAN MUSEUM

Virginia deer, American Museum of Natural History, mounted by Mr. Carl E. Akeley in 1902. This is an example of work that has made modern taxidermy an art. The work of the taxidermist is in a way more difficult than that of the sculptor, that is he must not only make a model of the animal in lifelike pose, but must then with great art fit over this model the unyielding skin of the animal.



HOWLING MONKEYS

In the Museum of the Brooklyn Institute of Arts and Sciences, mounted by Mr. J. William Critchley. It is a group whose main purpose is to show the varied attitudes of the animals. Such groups preceded the large naturalistic groups which combine artistic effect with instruction and so greatly enhance the educational value of museums

bring home to the observer the atmosphere and vegetation of some typical part of the country. But save in exceptional cases, the foreground does not exactly reproduce any given bit of country, although it does copy the plants and

shrubs found there. How these groups were prepared, what journeyings by flood and field they involved is told by Dr. Chapman himself in *Camps and Cruises of an Ornithologist* and very briefly in the leaflet describing these groups. The



THE BIRD ROCK GROUP

The first large bird group. This was made in the American Museum under the supervision of Dr. Frank M. Chapman in 1893



THE ORIZABA GROUP

The latest [1913] of the bird groups in the American Museum and typical of the "habitat groups." Constructed by Mr. William Peters and other preparators of the Museum



THE BULLFROG GROUP

Prepared in the American Museum in 1911 by Mr. Ernest W. Smith and preparators of the Museum. It was the first of the reptile series of life study groups constructed under the supervision of Miss Mary C. Dickerson



THE LOWER CALIFORNIA LIZARD GROUP

The third of the series of reptile groups in the American Museum, built in 1913 by Mr. Frederick H. Stoll and other preparators of the institution under the supervision of Miss Mary C. Dickerson



The Laysan Island group made for the State University of Iowa by Mr. Homer R. Dill. This group shows a portion of the albatross rookery on the little island of Laysan where millions of birds find a home in the middle of the Pacific Ocean

habitat groups thus involved a slight departure from nature, in that while the background depicted an actual scene, the foreground was often generalized and this involves the whole question of how far it is allowable to depart from actualities. May we combine animals from different localities or show together those taken at different seasons? Shall we fabricate our soil and "fake" our trees? Personally the writer believes that all these things are permissible, with certain restrictions, nay, in some instances, must be done, not merely to make a group at all, but to enhance its educational value. For example, a bison in his winter coat may be introduced into a group with the mother and young and a baby moose placed with an antlered

bull — in no other way can you complete the life cycle and tell the whole story.

Dr. Chapman found it physically impossible to bring away the water-soaked nests of the flamingos; Mr. Cherrie found equal difficulty with the sodden nests of the guacharo birds, while to carry off the cave in which they were found would have defied even Hercules in his prime. Here certainly, fabrication is a necessity; and if so much, why not more? If we cannot import a tree from the forests of Venezuela, let us "adapt" an ironwood from Vermont, whereon a colony of howling monkeys may disport themselves. In this case it is the animals and not their surroundings that are to be emphasized and the



added to museum exhibits, belong in still another category and may be termed synthetic, or life study groups, bringing together in one composite picture a number of animals that probably would not be found in so small an area at any one moment of the season depicted, but might all be found there at some moment of the season. Such a group may, or may not, represent a particular spot; it does depict the natural conditions under which the animals are to be found and shows them engaged in the most characteristic and interesting of their varied occupations. In this, the day of moving

accessories are a matter of secondary importance, merely a setting.

The first large group, the Bird Rock group, placed on exhibition in 1898, was not definitely planned as a habitat group, but merely as a picture of part of a famous and impressive bird colony and to make "a permanent record of this characteristic phase of island life." The Cobb's Island group was the next and the first real habitat group to be constructed, this subject being chosen partly because it provided a large and interesting group at small expense.

Year after year this series of groups has been extended, covering the country from east to west and north to south, until room is left for but one more and that, it is hoped, will include the bird life of the Arctic regions.

The bullfrog and giant salamander groups, which are among the latest to be

pictures we may say that as the moving picture condenses into five minutes' time the events of days or weeks, so these groups depict in a few square feet of space the life and happenings of a much larger area.

The group in its latest form is to be found in the Museum of the University of Kansas, where it includes a great part of the Museum, a special section having been constructed to contain a large cyclorama where the various North American animals from plain to mountain and from temperate to Arctic America may be viewed approximately as they would be seen in nature.¹ Somewhat similar is the Laysan Island group, executed for the State University of

¹ This prepared by and under the direction of L. L. Dyche, is an amplification of his ideas as shown in 1893 in the Kansas Building at the World's Fair.



CYCLOPORA GROUP

In the Museum of the University of Kansas, a group prepared by Mr. L. L. Dyche to show North American mammals from plain to mountain and from temperate to Arctic America



THE FOUR SEASONS — SUMMER
In the Field Museum, Chicago. By Mr. Carl E. Akeley, 1902



THE FOUR SEASONS — WINTER
In the Field Museum, Chicago. By Mr. Carl E. Akeley, 1902

Iowa by Mr. Homer R. Dill, where the visitor gazes about him at the imposing assemblage of albatrosses and other sea fowl, while beyond the blue Pacific stretches to the horizon. Aside from these the bison and moose groups in this Museum, by Richardson and Rowley, are the largest that have been made, and although they have been on exhibition for twenty-four and twenty years respectively, they compare favorably with those of to-day.

The African mammals by Mr. Carl E. Akeley in the Field Museum, are among the finest of their kind for pose and character, but the "Four Seasons," in the same museum and also by Mr. Akeley, depicting the Virginia deer in spring, summer, autumn and winter, represent high-water mark in this direction, combining as they do pictorial beauty with scientific accuracy of detail. It was while engaged on these groups that Mr. Akeley perfected the method of making the manikin, or artificial body on which the skin is placed, so as to combine strength, lightness and durability, and also devised methods for the rapid reproduction of leaves and a compound stronger and more durable than wax. The need for making leaves in large quantities is shown by the fact that in the "Four Seasons," the summer group alone called for seventeen thousand leaves.

Such, briefly, is the story of museum groups; they have grown from the little box containing a pair of birds and a square foot or two of their im-

mediate surroundings, to entire colonies of flamingos and albatrosses and the broad sweep of land or sea shown in the Orizaba and Laysan groups. No one man can justly claim credit for the beauty and accuracy of such groups as may to-day be seen in our larger museums; many have contributed to this perfection and some stand preëminent among the rest. To each and all his just meed of praise. Some, whose work might now provoke a smile, labored hard and earnestly in the face of many discouragements to lay the foundations on which we build to-day. Some of whom the present generation has never heard, held out a helping hand to the youthful would-be taxidermist and by aid and encouragement started many of our best men on their career, and some, keen observers of nature, endowed with artistic spirit and possessed of technical skill, have perfected what others began.



Head of mountain sheep, in the Brooklyn Museum. Mounted by Remi Santens, for many years at Ward's Establishment, now at Carnegie Museum, Pittsburgh



THE LARGEST AUROCHS RECORDED

The horns resemble those of the American buffalo with a turn at the end like those of a gnu. This aurochs was so bad-tempered that he became a menace both to keepers and animals of the forest.

His measurements and weight are officially recorded in Count Potocki's Estates Records as follows:

Length of horns $21\frac{1}{4}$ inches
 Greatest width between horns $24\frac{3}{8}$ inches
 Distance between points of horns $21\frac{1}{8}$ inches
 Diameter of horn $11\frac{1}{4}$ inches
 Distance between bases of horns $11\frac{7}{8}$ inches
 Length of body $107\frac{3}{4}$ inches

Length from nose to tail end $133\frac{1}{8}$ inches
 Length of head $27\frac{1}{4}$ inches
 Distance between eyes $15\frac{3}{8}$ inches
 Height at withers $73\frac{1}{2}$ inches
 Girth behind shoulder $108\frac{7}{8}$ inches
 Weight 2001 lbs.

HUNT IN A BIG GAME RESERVATION

ON THE ESTATE OF COUNT JOSEF POTOCKI IN VOLHYNIA, RUSSIA

By Walter Winans

Mr. Winans is not only a man with expert knowledge of the art of shooting but is also as evidenced in his book, *Deer Breeding*, a power in the preservation and propagation of game animals especially of the larger deer. He has devoted much thought and money to the subject on his estate at Surrenden Park, Pluckley, Kent. Among recent results of his work he has obtained a fertile breed from crossing the red deer, wapiti and Altai deer. This triple cross known in Germany as *Cervus winansis* has taken its place among other species in the deer forests of the German Emperor and in other game preserves.—THE EDITOR.

THROUGH the courtesy of Count Josef Potocki I was allowed two days' shooting in his game preserve of Pilowin, where there is a greater variety of different species of big game than anywhere else in the world.

Count Potocki in 1901 conceived the idea of fencing in a very large tract of forest on one of his estates in order to preserve the elk (*Alces alces* or *Alces palmatus* as it is known in Russia) which is a near relative of the American moose. This European elk is gradually being exterminated and it was to insure the safety of the remnant that Count Potocki made the reservation.

Pilowin is fortunately a part of the original habitat of the elk, having just the swampy spots these animals love. The beauty of the Pilowin forest is increased by the great clumps of yellow azalea that grow there, plants not known anywhere else in the neighborhood. It is supposed that when the Cossacks camped in the forest in one of their raids some three hundred years ago, the seeds of this species of azalea common on the Russian steppes were scattered from the horses' fodder.

After starting the reservation Count Potocki began to introduce all the sorts of deer that would thrive in the climate, which is very severe in winter. Thus he now has wapiti (*Cervus wapiti*), Caucasian deer (*Cervus caucasicus*), hangul (*Cervus cashmiricus*), maral (*Cervus*

elaphus maral), Chinese Thian Shan wapiti—in fact he is now turning in every species of large deer that he can get. He has not introduced any European red deer (*Cervus elaphus*) or fallow deer (*Dama dama*) as he wants to have large animals only. The forest contains a certain number of roe deer (*Capreolus vulgaris*) and he has tried turning into it Siberian roe (*Capreolus pygargus*) but these latter died off, although some of the roe that I saw I think must have crossed with the Siberian deer. The Siberian roe is very difficult to keep. I have tried several in my place in Kent, and all have died.

Year by year the Count has increased the area of the ground fenced in so that it now consists of some 32,000 acres. The past year in inclosing some extra ground, he was fortunate enough to include a herd of wild elk, which will be of great help in crossing the blood of those already inclosed.

In 1905 Count Potocki received three aurochs¹ (*Bison bonasus*) from His Imperial Majesty the Emperor of Russia, from the Imperial Preserves of Nielowicz and in 1906 he imported a pair of American buffalo (*Bison bison*). All these species of big game including the

¹The name "aurochs" properly belongs to the European wild ox (*Bos primigenius*) which became extinct in the early part of the seventeenth century. After its disappearance the name was transferred to the European bison (*Bison bonasus*).

aurochs have increased so that now there are large herds of deer and a considerable herd of aurochs. It is impossible however owing to the extent of the ground and the denseness of the forest to estimate the number. In addition Count Potocki is anxious to introduce some American moose to cross with the European elk for the improvement of their horns.

On September 25 I went out shooting in the Pilowin forest, taking stand in a clearing behind some trees. At first four wapiti stags came past on a gallop in single file, followed by a very large horned stag which I shot. Then followed a rush of some fifty wapiti stags and hinds. A herd of maral deer next passed with a very good stag among them which however the Count did not wish shot. Finally came five cow elk at which of course I did not shoot and the drive ended.

I immediately went to examine the stag I had shot and found it to be a cross-breed between the wapiti and the Caucasian deer (*Cervus caucasicus-wapiti*). It weighed 796 pounds as it fell and had fifteen points on the horns — very good horns, more of the European red deer type than of the wapiti.

Next day, I took my stand in the part of the forest where the largest aurochs was known to be. This bull aurochs was thought to be about thirty years old and had become bad-tempered and taken to killing everything he met. They had been obliged to treat him like a "rogue" elephant and turn him out of the herd. Before this took place however he killed a big wapiti stag, an American buffalo, and attacked one of the keepers who was passing on horseback, killing the horse and so severely goring the keeper that he had to be taken to the hospital for attendance.

In preparation for the hunt an old peasant had tracked the aurochs and

kept him under observation for several days and nights, lighting fires around him at night. As soon as the drive began the aurochs came cantering out some sixty yards away. When he saw me he stopped and I gave him a right and a left shot from my rifle. He turned and started galloping off, never staggering nor dropping on his knees although he had received two .303 bullets, one in the heart and one in the lungs. After going a short distance however, he stopped in a dense thicket where I had to give him several more shots to bring him down. He is the largest aurochs ever accurately measured and has horns five inches longer and of seven inches wider spread than the record aurochs in Rowland Ward's *Records of Big Game*.

The horns near the head are like an American buffalo's but have a turn at the end rather like a gnu's. I am told that only very old aurochs have this. A cast of the horns will be presented later to the American Museum.

After the aurochs fell I heard some wapiti roaring and succeeded in shooting one which weighed 837 pounds as it fell, and had horns with sixteen points. On the way back I shot a bull elk very fine as far as body was concerned (weight 943 pounds), but he had, like most European elk, rather a poor "head," that is to say the horns had none of the palmation of the American moose but were only like those of a two or three year old bull moose. This ended the second day.

This reservation is a most interesting and valuable experiment in animal preservation and I can report that all the deer which I saw were in perfect condition and in fact that all of the wild animals in the Pilowin forest seemed to be thriving.

IMPORTATION OF BIRDS

FIVE HUNDRED THOUSAND CANARIES AND THREE HUNDRED
THOUSAND OTHER BIRDS BROUGHT TO THE UNITED
STATES IN 1913, THROUGH AN IMPORTING
HOUSE OF LOWER NEW YORK CITY

By W. DeW. Miller

Special Inspector of Foreign Animals and Birds at the Port of New York, for the United
States Department of Agriculture

PROBABLY no importing house in this country is more unusual than that occupied by Mr. Louis Ruhe at 248 Grand Street, in lower New York City. Seen from the outside there is little suggestion of its interesting character, but the moment the visitor opens the door of the building hundreds of voices greet him, and he can easily imagine himself in a tropical jungle.

There are birds everywhere, on the shelves, on the floor, overhead and in the windows, birds of all kinds and colors, each singing in his own way regardless of his neighbors. Quite different however, is the effect as one mounts the stairs to other floors. On the second floor in particular, where there are canaries to the exclusion of all other kinds, the effect produced by the thousands of small voices blended together is indescribable.

It is on this floor that one gets a more adequate idea of the extent of the bird importing industry, for here small wooden cages with two canaries in each cage are piled high and so close together that only a narrow passage is left in which a person can move about. Here, almost hidden by the cages, one may be so fortunate as to meet Mr. Ruhe, the proprietor, and learn from him a little about his business and its history. The beginning was made by his great-grandfather, who traveled in

Russia and Australia in search of birds long before there were any railroads, and when it was necessary for him to tramp about with cages upon his back. The business is now the largest of its kind in this country.

Last year over five hundred thousand canaries, and about three hundred thousand other birds were imported. All come direct from Germany and not a week passes that a shipment does not arrive. The majority of the small birds are bred in captivity in Germany, France and Belgium. Most of the canaries are raised in the Harz Mountains, where the climatic conditions are unusually favorable, and chiefly between December and June. The proficiency of the canaries as singers is determined by an expert who stands before the rows of cages and in the babel of voices judges the ability of each bird by the movements of its bill. The birds are then marked as to grade, the value ranging from eighteen to ninety-six dollars per dozen.

On the other floors of the building are to be found scores of varieties and sometimes a single shipment will include as many as seventy kinds of birds. Among the birds that are imported in particularly large numbers, the canaries of course come first; and then the waxbills or weavers (comprising many species of small finchlike African and Asiatic birds), bullfinches, Australian shell parra-

keets, parrots of various species, cockatoos, shama thrushes, South American cardinals, African siskins and bulbuls. Of well-marked domesticated breeds imported in large numbers, are the white form of the Java sparrow, the yellow variety of the shell parrakeet and the pied variety of one of the weavers known as the Japanese or Bengalese nun.

Birds of every size from the tiny sun-bird, less than half as big as a canary, and so delicate that it is fed on honey and water with a little oatmeal, to the largest birds such as the emu, rhea, ostrich, vulture and maribou are among the list of importations. The larger and rarer birds are secured by men sent out in the interest of Mr. Ruhe and of his brother who has a similar business in Germany. These men visit all parts of the world and ship to Germany the birds they secure.

Zoölogical parks, private aviaries and bird-dealers throughout the country are supplied with whatever species are needed through Mr. Ruhe's establishment. Mammals of various kinds but in both number and variety much fewer than the birds are also imported. The larger kinds, such as lions, tigers, elephants and bears are not kept in Mr. Ruhe's store, but upon reaching port are sent direct to his "farm" on Long Island. The top floor of the Grand Street building is given up to monkeys, comprising apes, rhesus monkeys, baboons, mandrills and others, which are imported in

larger numbers than other mammals. Of the smaller quadrupeds guinea pigs and white mice should be mentioned, and among the reptiles is an occasional lot of pythons or turtles.

As a safeguard the Government maintains a careful inspection of all the birds that come into the country, the inspectors being specialists in ornithology appointed by the Government. The only restrictions made are in the cases of the European starling and house sparrow, which however are already thoroughly naturalized in this country, and among mammals the destructive mongoose, the introduction of which into the United States is rigidly guarded against.

An importer arranging for a shipment of birds from abroad applies to the authorities of the Department of Agriculture at Washington for a permit, stating the numbers and kinds of birds and other animals expected, with name of the vessel, port from which it is coming and approximate date of arrival. Because of the delicate nature of many of the birds and the disastrous results that might follow from exposure at the docks preceding and during inspection, the shipment is at once removed to the importing house and the inspection follows later. Complete records of the numbers and species of birds imported by the various dealers are made by the inspector and forwarded to Washington where they are kept on file for future reference.

THE ALGONKIN AND THE THUNDERBIRD

By Alanson Skinner

AMONG other traditions held by the descendants of the Delaware Indians, who used to dwell on our island of Manhattan and in neighboring New Jersey but who are now exiled to Oklahoma, is one regarding the so-called "Thunderbird." Long ago when the ancestors of the Delawares still lived on the shores of "the Great Water where Daylight Appears," some of their mighty nimrods succeeded in making captive the great horned serpent that lives in the depths of the sea, and while they held it prisoner they scraped some of the scales from its back.

Now the Thun-

derers are the great enemies of the horned serpent and are constantly on the watch to destroy him. Thus it happens that when a medicine man puts in an exposed place one of these scales taken from the horned serpent, the Thunderers hasten to the spot darting their lightning

at it and bringing the rain — which is just what the Indians desire.

The recorder of this tradition has left us in doubt as to the form of the Thunderers, whether like men or beasts, but the belief which he records concerning the Thunderers and their hatred of the horned snake or snakes is very widespread among the Woodland Indians. In



Cree tipi, Saskatchewan, showing a Thunderer in human form



Drawing of human Thunderer from carving on block of wood in a Menomini war bundle



Drawing of a Thunderbird etched on a potsherd. From Shinnecock Hills, Long Island

the Middle West; the Sauk and Fox, Menomini, Winnebago, Ojibway, Potawatomi and Ottawa, have many tales of this titanic feud. These tribes all believe that the Thunderers are mighty "super-eagles" who dwell in floating tiers of rock in the ether above man in the western sky. It is the flashing of their eyes which we call lightning and their raucous cries that we denominate the thunder. It is the duty of these birds to guard man, to rake the earth with hail and water it with rain, and above all, to prevent the evil horned snakes from destroying mankind. They are war gods and patrons of warriors and it was through them that the war bundles, sacred packs of talismans carried into battle as protection

from the arrows and bullets of the foe, were given to mankind by the Sun and the Morning Star.

In the Museum's collection in the Woodland hall are many examples of the images of these birds from all the central western tribes. They are mostly woven on carrying bags made of native basswood string with the designs in yarn or blanket ravelings. Most interesting of all is a painted robe which forms the inner wrapping of a war bundle. On it appear the Thunderers in both bird and

human form as protectors and patrons of warriors. The human Thunderers are always distinguishable by their possession of huge beaks in place of noses.

Another unique piece from nearer home, is a fragment of pottery found in 1902 on a Museum expedition to Shinnecock Hills, Long Island. On it is incised the crude figure of a Thunderbird, very



A Menomini woven bag showing the Thunderers. The bag is a very old specimen made of basswood bark fibre with the designs of buffalo-wool yarn

much like those shown on the woven bags from farther west. It is interesting in that it shows the eastern distribution of this concept.

Among the Plains-Cree, men who dreamed of the Thunderers not infrequently ornamented their buffalo skin tipis with paintings of the Thunderbirds in semihuman form. The photograph showing the Cree tent was made in the summer of 1913 in the Qu'Appelle Valley, Saskatchewan, and illustrates this custom.

NEW STORAGE ROOMS

PREPARATIONS FOR KEEPING UNHARMED FOR A MILLENNIUM SOME OF
THE MUSEUM'S MOST VALUABLE HISTORICAL COLLECTIONS

By Pliny E. Goddard

AS the years pass, one phase of the Museum's responsibility toward future generations becomes more emphatic. Its duty to the general public of the present generation is met in its exhibition halls in which the collections are displayed arranged by localities and tribes. Its duty to a smaller public of this and succeeding generations is met in its research work made available in the several series of publications. Specimens tell but a small part of a people's activity and thought, and by themselves are more or less meaningless. This work of research however is largely based upon specimens.

The primitive peoples of the earth are passing with ever increasing rapidity. Whole tribes even are becoming extinct. All over the world the old occupations and customs are being discarded in favor of European civilization. This means that in a few years we shall not be able to secure ethnological specimens from native sources.

In 1908 twenty-four storerooms were built under the eaves of the west wing and proved fairly satisfactory, but failed in not being sufficiently tight to exclude insects or to permit thorough treatment with gases to destroy the insects after infection had taken place. Those rooms having outside walls proved to be too damp for general purposes. Also the space provided by these rooms furnished storage for only a small part of the material needing especial care.

To meet this need sixteen new storage vaults have just been completed in the sixth story of the southwest pavilion. They are arranged in two rows, back to

back, and two stories in height, galleries and stairways of metal furnishing easy access to the upper tier. This arrangement provides ample space between the walls and roof of the building and the storerooms, protecting the specimens from moisture. The rooms themselves are of concrete with tightly closing metal doors rendering them fairly fireproof and entirely proof against insects and dust. If infection should take place through open doors or from the introduction of fresh material, cyanide gas can be generated in the rooms with entire safety. A room after being charged with poisonous gas can be thoroughly cleared by means of a permanent ventilating arrangement and electric fans.

The material stored in these rooms will in part be used for future exhibition when other halls are provided by the construction of the projected additions to the building. A large number of specimens however, will probably always be retained in storage because it is not necessary to display very extended series of related specimens and because very rare specimens ought not to be exposed to the risk of general exhibition. While in storage these specimens should be easily accessible to the special student, both to save time in looking for them and to prevent the deterioration resulting from constant handling. The new and old storerooms have been apportioned to the large culture areas.

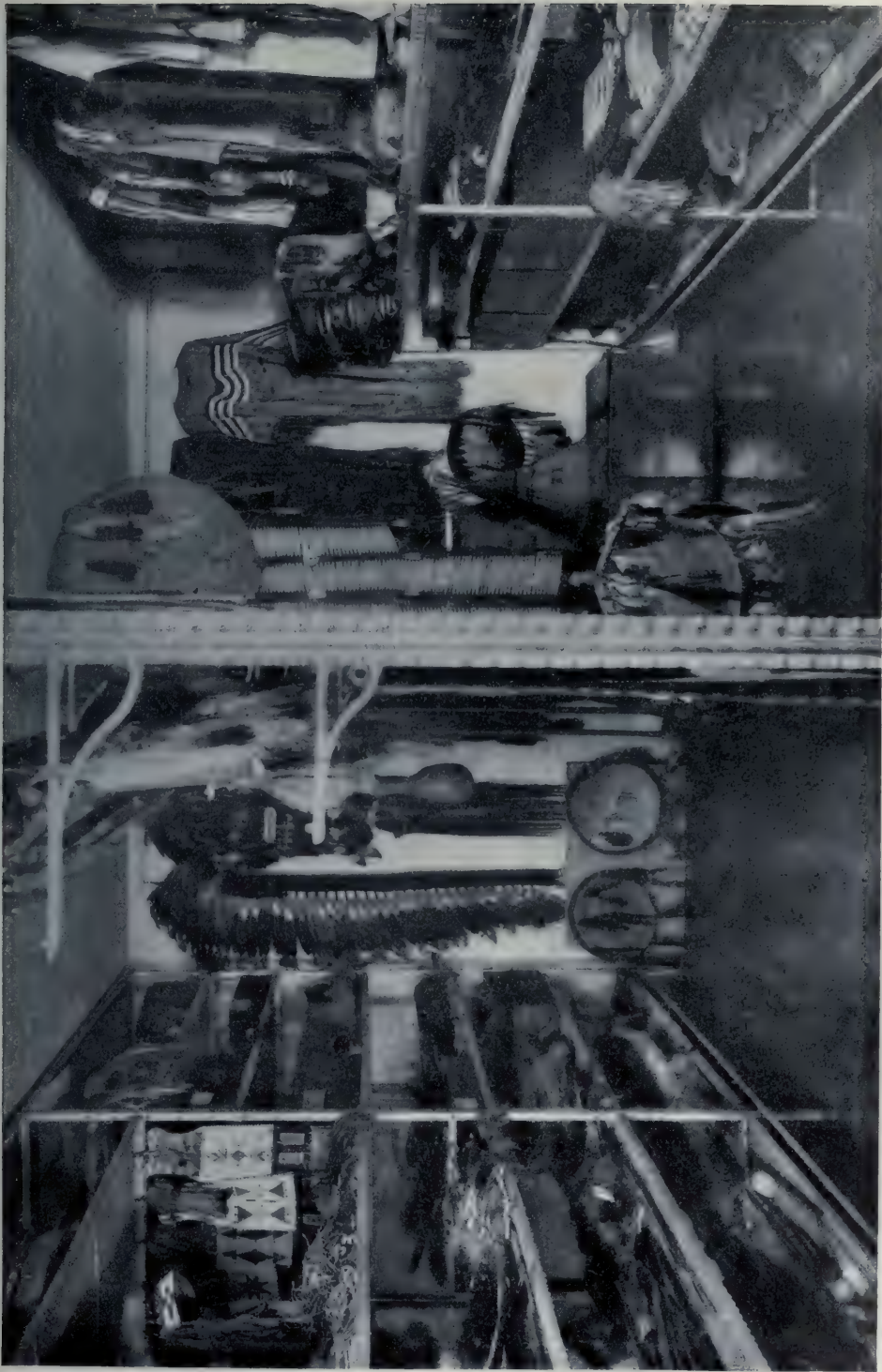
With the exception of skin clothing of native tanning, containing in some cases the elements of chemical decay, our collections ought to show little deterioration in a millenium.



A PORTION OF THE NORTHWEST COAST STORAGE ROOM

Storeroom devoted to the Indians of the Northwest Coast. A large number of Thompson and Fraser Rivers baskets are arranged so as to be easily accessible

Since the greater number of specimens are perishable, particular care must be taken of them if they are to be preserved for examination in the distant future. The chief causes of deterioration are the ravages of insects and chemical changes due to moisture and sunlight. The specimens must also be protected from thieves and from loss by fire



PLAINS INDIANS STORAGE ROOM IN THE AMERICAN MUSEUM

The interior of one of the new storerooms (about seventeen by fourteen feet), containing part of the Plains Indians collections. A rack through the centre allows for the hanging of the longer objects; a series of buckskin shirts are shown near the ceiling on the right, the smaller objects are in trays or spread on the wire-netting shelves

TEACHING IN THE AMERICAN MUSEUM¹

By Agnes Laidlaw Vaughan

AS an experiment in the teaching of history with the aid of museums, it was proposed to begin with a brief study of primitive man and the beginnings of human social life. A class of thirty-five boys of 5 B Grade, that is about twelve years old, visited the American Museum in charge of a teacher. The class was met by the Museum instructor in a small lecture hall, in which she had placed a collection of objects consisting of stone implements, wooden, shell and gourd utensils, baskets, pottery and weapons, all of which the children were permitted to handle. The boys had been reading *Robinson Crusoe*, so the instructor took the adventures of Crusoe as a text and compared his situation with that of early man, dependent on his surroundings and on his powers of invention.

The theme of the lesson was the increase of man's power over matter, illustrated by the evolution of his tools as his power to use perception and memory developed into reason. A river pebble was shown as the earliest hammer; next the hammerstone with pits hollowed to fit the thumb and finger, a shaping of the implement that augmented its utility while it diminished the effort required to produce effect. Axes and knives of flint, chert and obsidian were examined and the growth of the ideas of symmetry and adaptation were

discussed as well as the effect of the nature of material on the perfecting of the tool. Also a digging stick, the precursor of hoe and plough, was studied, together with bows and arrows, slings, stone, shell and iron-pointed spears, used in war and hunting, and implements designed for the preparation of food, with questions as to their modern equivalents. Emphasis was laid on the persistence of form in some articles, which illustrates the happy discovery by the early makers of a perfect adaptation of the implement to its uses. The effect on the growth of human mind and power came in for consideration, the development of ingenuity and invention from these simple origins which have made possible the complex machinery and processes of modern times. After the discussion the class visited the anthropological halls and asked many more questions in relation to the material on exhibition.

Another lesson, conducted in similar fashion, took up primitive fire-making, the preparation of clothing and the beginnings of art, earliest manifestations of love of beauty and of that need for self-expression which is the deepest craving of humanity, the end toward which the satisfying of hunger and other passions is but a means.

Several members of the classes afterward called at the Museum to ask the instructor further questions. No tabulated record of results could be made from this experiment but there was neither doubt of the interest aroused in the children, nor of their eagerness for "more."

The recent installation of the exhibit on the antiquity of man will be of value

¹In line with the work in teaching described here, an elaborated series of lessons has been prepared for a class of teachers from the New York Training School. On the completion of this course in the American Museum the class will continue the work at the Metropolitan Museum of Art. A similar experiment is being carried on in Boston to correlate education in public school and museum, and notes on the results of the experiments will be presented at the Museums Association meeting in May.

in lessons of this kind. Such lessons could be expanded and carried on into picture-writing, folklore, religious and social customs, effects of climate and natural resources on development of culture and on the temperament of peoples, all stated in simple terms with material illustration.

The child being in the objective stage of mental development is interested in primitive man, the problems that he faced and the means he used to solve these problems successfully — although the needs of the boy of to-day may be working themselves out through the construction of complicated motor boats, aëroplanes or instruments for amateur wireless telegraphy. All technical labor however gains in dignity when one knows

its beginnings. Perhaps the products of human labor will increase in beauty when we understand that the need for beauty is an essential element in humanity. It lies at the root of the forming of moral principles, of all social evolution. It leads toward the perfecting of the tool to its use, to the satisfying of the instinct of joy, toward health and uprightness.

In the folk museums and historical collections of Europe, this method of teaching history could be carried readily into the study of a nation or of European culture as a whole. In America the museums of fine arts can provide the lessons when the study passes beyond the period of the foundations of culture, into those periods in which the expression of human activity is more complex.

MUSEUM NOTES

SINCE the last issue of the JOURNAL the following persons have been elected to membership in the Museum:

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At the annual meeting of the Board of Trustees the following new trustees were elected: Mr. George F. Baker, to fill the vacancy due to the death of Mr. J. Pierpont Morgan; Mr. R. Fulton Cutting, for the vacancy made by Mr. William Rockefeller's resignation necessitated by ill health; Mr. Henry C. Frick for the position opened through the death of Mr. George S. Bowdoin;

and Mr. Archer M. Huntington, elected to membership to cancel the vacancy brought about by his own resignation in 1912.

DR. WILLIAM K. GREGORY has been promoted from assistant curator in the department of vertebrate palaeontology to associate in palaeontology.

DR. PLINY E. GODDARD, associate curator in the department of anthropology, has been promoted to the position of curator of ethnology.

DR. LOUIS HUSSAKOF has been promoted from assistant curator of fishes in the department of ichthyology and herpetology to curator of ichthyology.

MR. VILHJÁLMUR STEFÁNSSON, in recognition of the important explorations that he has carried on and his contributions to the science of geography and ethnology, has recently been made an Honorary Fellow by the Trustees of the American Museum of Natural History. This is the highest honor that it is within the power of the Museum to bestow and has been awarded to but seven other persons during the history of the institution.

THE NEW YORK ZOÖLOGICAL SOCIETY has presented two orang-utans and "Baldy," a chimpanzee, to the American Museum. Practically all of the anthropoids at the New York Zoölogical Park were killed recently by an epidemic of tuberculosis and have been distributed among the various institutions where they will be of the greatest value to science.

THE new "visitors' room" of the Museum is situated on the first floor at the right from the main entrance. It furnishes a comfortable place where people may wait for their friends — which perhaps is its greatest usefulness; it provides facilities for writing or resting, also for consulting or purchasing the Museum's scientific and popular publications which are to be found there. An attendant is in charge during the hours that the Museum is open for visitors. The number of visitors who have made use of the room averages thus far about one thousand a month.

MR. GEORGE SHIRAS, 3d, of Washington and MR. H. E. ANTHONY of the Museum's department of mammalogy, are studying the fauna of the Gatún region of Panama. Because of the flooding of the region it is ex-

pected that the animals will be concentrated in small areas and that rivers which before were unnavigable may be ascended for the purpose of collecting specimens. Mr. Anthony will endeavor to secure jaguar, puma, tapir, tiger cat, deer, peccary and other specimens for the Museum, and Mr. Shiras, who has an international reputation as a photographer of wild animals, will take flash lights and other pictures with cameras especially designed for the work. The expenses of the expedition, with the exception of Mr. Anthony's salary, are borne by Mr. Shiras.

THE ROOSEVELT SOUTH AMERICAN EXPEDITION has just sent to the Museum a shipment of one hundred and forty-eight bird skins from Paraguay. Colonel Roosevelt will probably return early in April and it is expected that he will deliver his first public lecture to the members of the American Museum.

MR. DONALD B. MACMILLAN and the other members of the Crocker Land expedition are in winter quarters at Etah, the old camp of Peary on the coast of Greenland, as published in the October, 1913, JOURNAL. No word has been received from the expedition since the account of the arrival at Etah. Greetings from the Museum were sent at the beginning of the New Year by the Marconi Wireless Company of Canada, through the courtesy of Mr. G. J. Desbarats, Deputy Minister of the Naval Service at Ottawa.

BESIDES the courses of lectures on history and geography which have been arranged for school children [noted in the January JOURNAL], the Museum announces the following lectures on subjects connected with natural history: March 26, "The Sea Creatures of Our Shores," Mr. Roy W. Miner; April 2, "The Birds of Our Parks," Dr. G. Clyde Fisher; April 16, "Fur-bearers Found Within Fifty Miles of New York City," Mr. H. E. Anthony; April 23, "Wild Flowers of the Vicinity of New York City," Dr. Fisher.

SCIENCE stories for the children of members will be told on Saturday mornings at 10:30 and will include subjects and lecturers as follows: March 7, "Seals at Home," Roy C. Andrews; March 14, "Water Babies," Roy W. Miner; March 21, "Our Neighbors in Feathers," Frank M. Chapman;



THE VISITORS' ROOM IN THE AMERICAN MUSEUM

March 28, "Katydid, Crickets and Other Insect People," R. L. Ditmars.

DR. P. J. OETTINGER has presented to the Museum his entire collection of ores gathered through a lifetime spent in Mexico and various other parts of the mining world. The collection consists of about thirteen hundred specimens of silver, gold, lead and zinc ores.

DR. H. J. SPINDEN of the department of anthropology is carrying on archaeological explorations in Central America.

MR. W. DEW. MILLER has recently published a paper of seventy-three pages on a *Review of the Classification of the Kingfishers* which makes notable changes in the arrangement of the various species, dividing the family into three subfamilies instead of the two commonly recognized. The changes are based on both external and internal characters and also have the corroborative support of geographic distribution.

Our common belted kingfisher is the representative of one subfamily, *Cerylinæ*, the only one of the three whose members are found in both hemispheres, but we shall know him no more under the name *Ceryle* for this proves to be the exclusive property of the African black and white bird. The beautiful little European kingfisher, the Alcedo or Aleyon of the ancients, the harbinger of fair weather, typifies another subfamily, *Alcedininae*. It is restricted to the eastern hemisphere and with the exception of one genus does not occur in the Australian region. The third and largest group, *Daceloninae*, containing the greatest number and variety of species is, with the exception of two genera, confined to the Australian and Indian regions. It includes those species having the habits of flycatchers and those that feed largely on small reptiles.

THE cover photograph of this number of the JOURNAL is from the painting "Tiger and Cobra" by Charles R. Knight. The March number will contain reproductions in black and white of a long series of his canvases and a reproduction in color of one of his notable fish paintings.

DR. HENRY E. CRAMPTON has just returned from a month's stay in Porto Rico where he

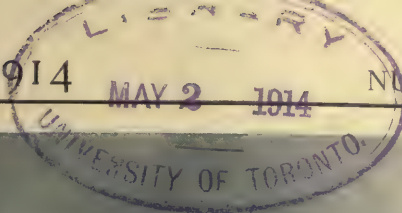
placed the project of a complete scientific survey of Porto Rico before the Governor and other officials of the island with a view to securing the coöperation of the insular government in the work. He also conducted a general scientific and a special zoölogical reconnaissance preparatory to future intensive work in characteristic localities. During the course of the reconnaissance more than 1300 miles of motoring and railroad travel were accomplished. Indian engravings were examined and photographed at several localities, notably inland from Utuado and along the Rio Blanco north of Naguabo. The general geology of the island was worked out as far as the peripheral sedimentary rocks, the inner limestones and the central igneous formations are concerned. Limestone caverns in three places—Corozal, Aguas Buenas and Ciales—were explored and photographed. Fossil-bearing strata were recorded in several localities and representative specimens secured. Also zoölogical collections were brought back from various caves, meadows, forests and plantations.

THOSE interested in the work of Mr. Vilhjálmur Stefánsson, for four years connected with the American Museum in the Stefánsson-Anderson Arctic expedition and now leader of the Canadian Arctic expedition, will be glad to learn definitely that the report is false which appeared in the newspapers in November stating the loss of the "Mary Sachs," one of the vessels of the expedition. The news that the "Mary Sachs" together with the "Alaska" is safe in winter quarters at Collinson Point, fifty miles from Flaxman Island, arrived December 23 from Dr. R. M. Anderson, second in command of the expedition, and finally from the explorer himself when he cabled the *New York Times*, "... On December 14 I reached Collinson Point and found both schooners safe wintering in the bay," and again in speaking of the spring plans for the ships, "I shall proceed with both [the 'Alaska' and the 'Mary Sachs'] to Herschel whenever possible... The 'Alaska' will proceed to Coronation Gulf and the 'Sachs' will undertake the work of the 'Karluk' if the 'Karluk' is not reported by the time of the first opportunity to sail from Herschel."

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MARCH, 1914

NUMBER 3



THE AMERICAN MUSEUM JOURNAL



FREE TO MEMBERS

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The Museum is open free to the public on every day in the year.

The American Museum of Natural History was established in 1869 to promote the Natural Sciences and to diffuse a general knowledge of them among the people, and it is in cordial coöperation with all similar institutions throughout the world. The Museum authorities are dependent upon private subscriptions and the dues from members for procuring needed additions to the collections and for carrying on explorations in America and other parts of the world. The membership fees are,

Annual Members.....	\$ 10	Fellows.....	\$ 500
Sustaining Members (annually)....	25	Patrons.....	1000
Life Members.....	100	Associate Benefactors.....	10,000
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The Museum Library contains more than 60,000 volumes with a good working collection of publications issued by scientific institutions and societies in this country and abroad. The library is open to the public for reference daily — Sundays and holidays excepted — from 9 A. M. to 5 P. M.

The Museum Publications are issued in six series: *Memoirs*, *Bulletin*, *Anthropological Papers*, *American Museum Journal*, *Guide Leaflets* and *Annual Report*. Information concerning their sale may be obtained at the Museum library.

Guides for Study of Exhibits are provided on request by the department of public education. Teachers wishing to bring classes should write or telephone the department for an appointment, specifying the collection to be studied. Lectures to classes may also be arranged for. In all cases the best results are obtained with small groups of children.

Workrooms and Storage Collections may be visited by persons presenting membership tickets. The storage collections are open to all persons desiring to examine specimens for special study. Applications should be made at the information desk.

The Mitla Restaurant in the east basement is reached by the elevator and is open from 12 to 5 on all days except Sundays. Afternoon Tea is served from 2 to 5. The Mitla room is of unusual interest as an exhibition hall being an exact reproduction of temple ruins at Mitla, Mexico.

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Photo by Miz

CHARLES R. KNIGHT
PAINTER AND SCULPTOR OF ANIMALS

THE AMERICAN MUSEUM JOURNAL

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CHARLES R. KNIGHT—PAINTER AND SCULPTOR OF ANIMALS

WITH AN INTRODUCTION RELATIVE TO THE UNION OF ART AND
SCIENCE IN THE AMERICAN MUSEUM

Illustrations¹ from the canvases of the Artist

THERE are many people who know something of the American Museum of the past—of its small beginning in the Arsenal in Central Park and its change to the new building, the central wing of the present structure; of its many years of strictly technical exhibits, systematic collections like some still to be seen as in the North American bird hall; of the addition of the south façade and the west wing and the gradual introduction of exhibits more adapted to the needs and the pleasure of the people.

We know that the construction of its buildings has always been in the hands of architects of a high order, that its exhibits have been under the supervision of a staff of more or less note in the scientific world. Do we know that now its exhibits and the newly-planned east façade of the build-

ing are calling to the work not only scientists, not only architects, but also various noted representatives from the guild that has the creation of the beautiful its aim—namely, sculptors and painters. It is interesting in this connection that almost the first step toward the foundation of science museums in this

country was made in Philadelphia at the close of the eighteenth century by Charles Wilson Peale, an artist who had first been a taxidermist. He was a man of fame as a portrait painter of the great men of his time, and by painting a portrait of himself in his museum he made this early step toward science museums an unforget-

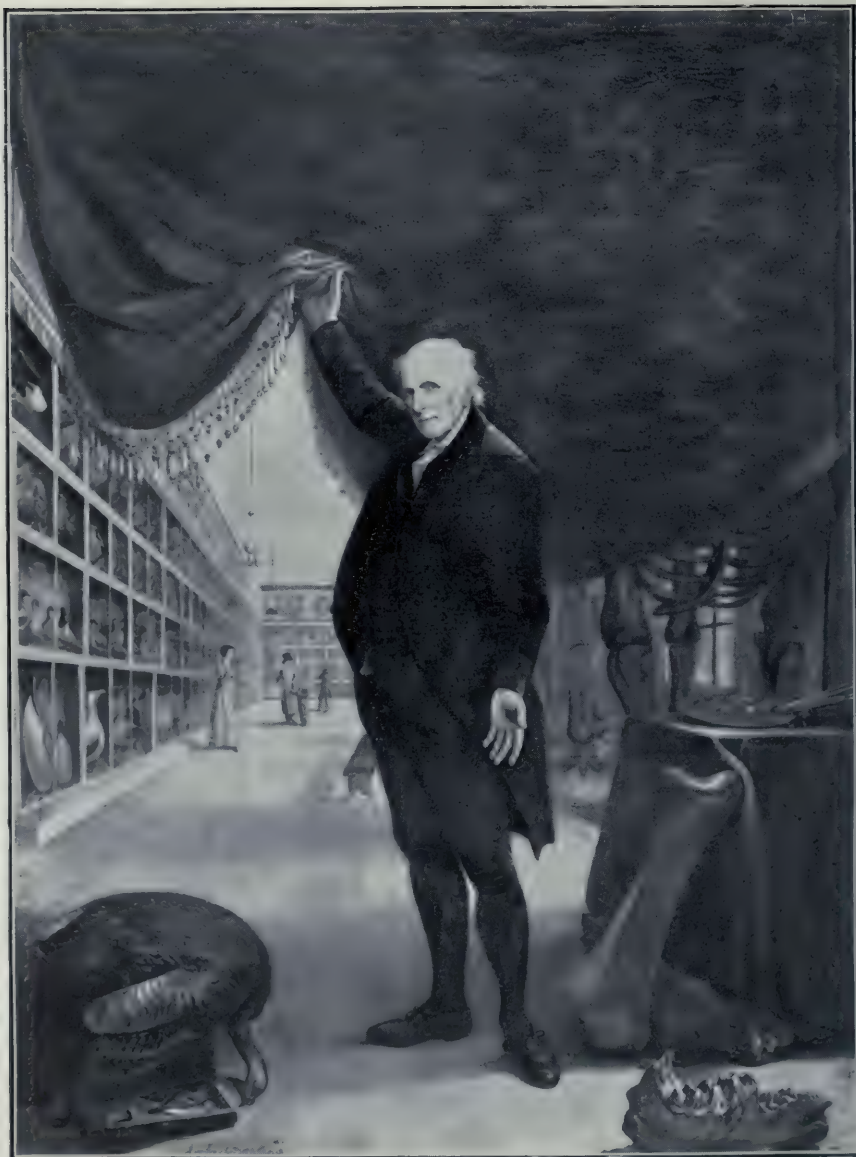
table one in history. This picture is reproduced through the courtesy of the Pennsylvania Academy of Fine Arts.

To-day in the American Museum Hobart Nichols, one of our rising landscape painters, is continually called upon to paint large background canvases for cycloramic groups, and similar work is



Property of the Artist
Leopard drawing, showing pencil technique

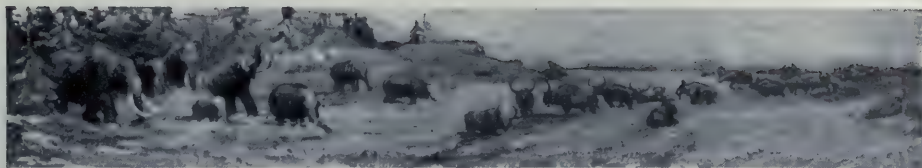
¹Illustrations copyrighted by the American Museum of Natural History, the Century Company and Charles R. Knight.



Courtesy of Frederick A. Stokes Company, New York

CHARLES WILSON PEALE IN HIS MUSEUM, PHILADELPHIA, 1777

Noted portrait artist of the last quarter of the eighteenth century, who made one of the first steps toward the inauguration of science museums in this country. [The Charleston Museum is supposed to be the oldest museum in America.] Many of his ideas regarding artistic exhibition we are just beginning to carry into effect to-day. This portrait of Peale by himself is the property of the Pennsylvania Academy of Fine Arts



Property of the Museum

done by Robert Bruce Horsfall, Carl Rungius and Charles J. Hittell. Charles R. Knight has planned a series of murals to surround the halls of fossil mammals; E. W. Deming has made sketches for a mural series which has been accepted for the Plains Indian hall; Will S. Taylor is the creator of six large mural canvases in the North Pacific hall—where also are Eskimo paintings by Frederick A. Stokes—and Mr. Taylor in his studio in the northwest tower of the Museum is working at present on a second series to show Indian ceremonials. Howard McCormick is painting a canvas 19 by 48 feet, in the hall of the Southwest Indians to form the background for a group of figures which are being made by the sculptor Mahonri M. Young; and so on. Various mural studies have been copied from old cave paintings by Albert Operti who also has painted some backgrounds for groups. Carl E. Akeley, a newly recognized sculptor, engaged immediately in the work of mounting an elephant group for the Museum, has been given charge of the plans for the future African hall, into which will be drawn A. Phimister Proctor and other sculptors and artists.

It is a new era for museums and for the American Museum in particular, and

it is but begun. Scientist, sculptor and painter will go on with work more closely amalgamated in exhibition. Architect, sculptor and painter will continue hand in hand in the construction of buildings. Thus results will always become more satisfying to the millions of people who, because limited in opportunities for education and obliged to live for the most part in humble surroundings, will look more and more to the free museum and its exhibits for instruction and for the beauty, gentle or austere, their imaginations crave.

The new era for museums in America is of course but a part of a larger movement felt in many lines of thought and work and it correlates closely with the increase in free art and music of the highest class, of free education in many things ideal along with the practical, of all conditions tending toward a spiritualizing of the race over and above the rapid material advance.

Understanding this, we give unstintedly of what we have—interest, time, work or money. We can but give ourselves more gladly when we look ahead and realize that the people of America can be consciously guided to a future great in a degree we to-day can conceive but cannot compass, and that the guidance



Property of the Museum

Two of Knight's sketches for murals in the fossil halls of the Museum



Property of the Museum

Allosaurus feeding on the remains of an amphibious dinosaur.— Restoration of a carnivorous dinosaur from Wyoming representative of the Age of Reptiles. The artist has shown the ferocious reptilian head, with huge mouth bristling with sabre-like teeth, the large birdlike hind limbs, the tail used in balancing and the sharp talons of the feet. Although this conception of the animal has been elaborated from detailed anatomical studies, the finished picture has no suggestion of the laboratory but instead the animal seems alive and in a natural habitat



Property of the Museum

Ornitholestes — Restoration of a small carnivorous dinosaur of the Age of Reptiles, from Wyoming. This dinosaur is a biped like *Allosaurus* but its proportions are light and graceful as compared with the larger members of the group



Property of the Museum

ICHTHYOSAURUS—RESTORATION OF A MARINE REPTILE

This catch-word of popular zoölogy, *Ichthyosaurus* (the first part signifying "fish," the second "lizard"), is one of nature's deceptions. Just as you cannot make a silk purse out of a sow's ear, but as Professor Gadow says, you can make a purse, so nature could not make a real fish out of a crawling reptile but she could make a fair imitation. *Ichthyosaurus* is a reptile as much as is a crocodile or a lizard but it is covered over with a fishlike (or rather porpoise-like) skin. The fore feet have turned into paddles; the skin on the back forms a dorsal fin. The fin on the tail is fishlike in form. All these features are exquisitely preserved in some of the wonderful fossils found at Solenhofen in Germany with the contour of body, back-fin and paddles outlined in the rock. The Ichthyosaurs are viviparous, and Knight's painting represents the newly born young swimming along with the mother in pursuit of a school of fish. The Museum specimen on which this restoration was based contains the remains of a brood of unborn young

is to come largely through free educational organizations like the museum. We give of ourselves the more eagerly when we know that we are building not only for the appreciable results of to-day and affecting the future not only through inherited and traditional results from

craftsman in the work, every seeker to set forth the truth, to do the utmost in him; every man who finances such monuments of art and science to give generously that he may get the highest results the times can give; and especially does it behoove every authority in



Property of the Museum

Tylosaurus — Restoration of a marine lizard from Kansas. *Tylosaurus* is a relic of the time when the sea spread up from the Gulf of Mexico all through the Middle West. In Kansas the chalky deposits of this inland sea in some places are packed with remains of reptiles, fishes, sea lilies and a host of other marine types. The *Tylosaurus* itself is almost a true sea serpent. Two fishes are shown jumping out of the water to escape the onslaught of the sea monster

to-day, but also that we are raising permanent monuments of art and science, some of which will be of such excellence that they will stand as a stimulus to the coming centuries, besides showing what we could do in this twentieth century. It behooves every

charge of the work that he choose wisely his craftsmen, men of training and thought, scientists of sincere purpose, artists of eagerness of devotion, that the required excellence and permanence be arrived at — the former making the latter a stimulus and blessing in-

stead of as far-reaching a discouragement.

One of the first men to be drawn into the American Museum to help in the correlation of science and art was Charles R. Knight and the work was financed by the late Mr. J. Pierpont Morgan. He came in 1896 to make restorations of fossil animals under the supervision of Professor Henry Fairfield Osborn. He had always liked best to draw animals, although at sixteen years of age he had begun studying at the Metropolitan Museum of Art, working in ornamental design and architecture. Also he had studied at the Architectural League under George de Forest Brush and Willard L. Metcalf. In fact he had spent three years at Lamb's designing stained glass windows, since those early days, but his interest always lay in animal portraiture.

All the old keepers at the Central Park Zoo remember him when he was a very small boy and was brought by his father on Saturdays to draw the animals. This was before the organization of the Zoölogical Park in the Bronx which brought such large opportunities to him, with a freedom for work far in advance of that allowed in the zoölogical parks of Europe, where however he has done considerable study. It was while drawing at the

Jardin des Plantes in Paris that his work was stimulated by the admiration of Gérôme and Frémiet with whom he had personal acquaintance.

In 1896 when he came to the American Museum he brought a full equipment: mastery in the technique of pencil, water



Arsinoitherium — Restoration of a herbivorous mammal. The scene is in Egypt on the site of the former Lake Mœris. There in the far-off Eocene times flourished a multitude of strange animals. In the painting the *Arsinoitherium*, named in honor of the Egyptian queen, stands at bay warding off a snarling pack of wolflike mammals

color and oil, and knowledge of the anatomical structure of living animals gained not from photographs but from life itself — these added to enthusiasm. His work that he began then and has continued

at intervals during the years since, constitutes an entirely original line of study that to-day is being imitated with more or less success in various American and foreign museums. The recent series of life-size restorations exhibited in the Hagenbeck Park of Hamburg for instance, was largely influenced by Knight's early work.

Mr. Knight combines in his restorations realism and artistic atmosphere, and backed by the facts of science and

fossil remains of the skeleton, then to place the model in the sun for realistic effects in drawing.

Before the time of Knight's work, all restorations of extinct animals, such as those of Cuvier from fossils found around Paris and those of Owen, had been entirely without artistic effect, and while the restorations of Owen were anatomically correct, the many made by the English artist, Waterhouse Hawkins, for Princeton and other museums were



Property of the Museum

Gigantic sabre-tooth tiger of the early part of the Pleistocene Epoch in Brazil. The sabre-tooth is shown stalking out to the edge of the cliff at sunset and snarling his defiance at some beast below. Perhaps he sees a huge ground sloth and will bound down and tear the unwieldy creature with his dagger-like tusks. Some of his relatives ranged into North America but he is characteristic of Brazil

the opinions of a man experienced in making accurate deductions, he succeeded in making these animals, which have not walked the earth for a million or more of years, look as though they are alive and in their natural haunt. It was in connection with these restorations that he began his work as a sculptor, adding thus a new medium. He found it of practical help to model the animal first, working up the form from the

characterized by lack of accuracy. Especially is this true of the models to show extinct reptiles. In great contrast stand Knight's large series of paintings and models.¹

¹ Knight's series of prehistoric restorations produced between 1896 and 1900, are now exhibited in the fossil vertebrate hall of the Museum and have been reproduced in many foreign museums, notably Paris, London and Munich. A second series comprising in part the same animals, is now under way, based upon more recent and precise knowledge both of the structure and the probable habits of the various types.



Property of the Museum

Huge imperial mammoth, representing the Pleistocene Epoch and the beginning of a temperate climate in North America. This mammoth, with a height at the shoulder of more than thirteen feet, over-topped the largest existing elephants



Property of the Museum

American mastodon — Restoration founded on the "Warren mastodon" in the American Museum. This lumbering old elephant was abundant over all the Western States after the close of the Glacial Period and probably before the advent of man. It is shown in a north temperate forest



LEOPARD WITH FLAMINGO

A small picture in water color, owned by Professor H. F. Osborn. It is on subtle work like this that Knight's reputation as an imaginative artist rests



Property of the Artist

Study for painting of setters

One of Mr. Knight's best known paintings is of the two prize winning collies, Blue Prince and Wishaw Clinker, which belonged to the late Mr. J. Pierpont Morgan

Mr. Knight is known to the world however as a painter and sculptor of modern animals also, and New York has recently had the unusual opportunity of seeing a large collection of his work in a public exhibition at the Museum. Hitherto he has been known by the people who have seen one or more of his scattered works, those for instance in the homes of Mrs. J. Pierpont Morgan or of Professor Henry Fairfield Osborn, of Mrs. Dean Sage of Albany, of Mrs. Archibald Rogers and Mrs. E. H. Harriman of New York. Some have seen his work at Woods Hole where he often spends the

summer, given every facility through the courtesy of the United States Bureau of Fisheries stationed there and of the Marine Biological Laboratory. He particularly excels in these fish paintings, whether the canvas is of highly decorative character such as the panels owned by Professor Osborn or those more directly scientific,

like the series of shark paintings completed for the United States Government in the summer of 1913. Others have known his models of the African elephant heads on the north façade of the new elephant house in the Bronx Zoölogical Park—a commission gained through an anonymous



Jaguar head in pencil



Owned by the Artist

TIGER AND COBRA
CANVAS IN OIL BY CHARLES R. KNIGHT

competition—and also the life-size heads of tapir and rhinoceros for the same building and the heads that decorate the zebra house.

In this exhibition at the Museum there has been an opportunity to see brought together more than one hundred canvases and bronzes, loans from their owners and pieces still in the artist's hands, and the effect has been to all who saw it unexpectedly convincing. His work is marvelous in its range of methods of technique. Where is there another American artist still relatively a young man, who excels in pencil, water color and oil and emphatically as a sculptor? Again, his subjects are taken broadly from the various classes of the animal world and thus the diversity of subject is almost as surprising as the range of technique. Canvases or bronzes of tigers, leopards, lions and pumas, are displayed beside those of dogs or bears or buffaloes, beside harpy eagles and pheasants, Bermuda or Sargasso fishes, elephants or great prehistoric dinosaurs.

Expert opinion can only pronounce the quality of the work of the highest. It varies greatly it is true, his great strength lies in his work with the big felines, while some of it was done merely as illustrative work appearing in magazines. Yet when we look at such a paint-



Property of the Artist

Harpy eagle with macaw. This canvas is a most happy study in color, handling with great skill the brilliant plumage of the two birds, besides being original and unusual in subject



Entrance to elephant house in the Bronx Zoölogical Park.
Model of African elephant head by Knight

ing as the "Leopard with Flamingo" which Brush pronounces of great imaginative merit—a picture good in composition, splendid in technique, fine in drawing, beautiful in color, we distinctly feel that criticism is vain, that no other painter in America has perhaps ever done so fine a pure art thing of animals. Also when we look at such a painting as the "Tiger and Cobra," criticism is vain for we are look-

ing at the work of a master of color.

It is worthy of note that his pictures have no earmarks, unless the mural character might be termed such, by which they can always be recognized, as is the case in the work of many artists. He has apparently made no attempt to imitate the work of any artist or school of artists or to follow along the line of any style or technique in any individual piece of his own work. He attempts each time to make a portrait or an imaginative group true to life and his own idea, with an artistic setting, apparently delighting in adjusting himself anew both to subject and technique.

We have heard little or nothing in recent years however, either in Europe or America of animal painters. It has been true in the art world that if a man did

not paint cattle or sheep, portraits, figures, still life or landscape he did not paint anything, the cattle, and sheep



Book rest — One of the artist's small bronzes



Courtesy of The Century Company

ANGEL FISH IN THE SEAS OF BERMUDA
BY CHARLES R. KNIGHT



RECLINING TIGER — A DECORATIVE PIECE

Owned by the Artist

being recognized as objects of art because in the past they were painted by certain well-known foreign artists. The market has been so ruled by precedent and fashion that no first-class painter has dared paint any other animals. The painter of horses and dogs has been able to find little market for his paintings except in stock magazines and the painter of wild animals has had to place his pictures in sporting magazines. A few years hence it will perhaps have been proved that Knight working single-mindedly along the line of his interest has had some influence toward bringing about the condition in which work stands on its merit, irrespective of any fashion in dictated subject. What is no doubt true, is that there is already well started a small movement, of which Knight stands in the front rank among the forerunners, for the wild animal in art, just as there has been in literature, and that this movement will work itself

out during the next half century in many additions to our animal bronzes and particularly in animal mural decorations.

The character of Knight's portrayal of animals is one about which there has been much controversy among artists. He paints nature as he sees it. He is so great a lover of truth that the "Tiger and Cobra" for instance was made not merely from studies of the tiger from life; the tiger was modeled and a tiger skin spread over this model in the sun to get the basis of realism in color, light and shadow on which to build the artist's picture. Like the old Barbizon French school he tries only to learn from nature, portraying the exact truth of form and color, as subtly affected however by light in an atmosphere. Like La Farge who was largely influenced by this school, Knight adds something of the scientist—in fact of the true naturalist—to his ability as an artist.

M. C. D.



Property of the Museum

Restoration of the dinosaur *Diplodocus*

COLLECTING IN CUBA

TEN THOUSAND INSECTS COLLECTED PRELIMINARY TO A COMPARATIVE STUDY OF THE FAUNAS OF FLORIDA AND CUBA

By Frank E. Lutz

THE work which the Museum and the outside entomologists who have kindly joined with the Museum have been doing on the insects of Florida, naturally raises questions as to the relationships between this fauna and those of other regions. The large island of Cuba lies not much over a hundred miles to the south and yet, judging from the published records, there are very few species common to the two places. One of the reasons for this is that Cuban records are largely from tropical forests and precipitous mountains, while Florida is made up for the most part of either swamps or open pine-palmetto woods on a level sandy plain. If extensive stretches of the latter environments existed in Cuba, especially in the western part without a goodly percentage of Floridian insects the condition was in urgent need of explanation. We learned from Dr. Nathaniel Britton that similar environments are found west of Havana and after receiving valuable suggestions from him, Mr. Charles W. Leng and the writer started out to see what could be found.

As a matter of course one of the first things we did after reaching Havana was to call on Dr. Carlos de la Torre than whom no one is more familiar with Cuban natural history or more willing and able to help other students of it. Unfortunately the necessity of giving college examinations prevented his going to the field with us and we started out alone — almost regretting that Cuba has such an excellent school system.

A rural electric road took us about thirty-six miles to Guanajay in the east-

ern foothills of the Cordillera de los Organos, the mountains of western Cuba, and an automobile stage from there to the shore at Cabañas. This stage ride is a pleasant one through fertile thoroughly-cultivated country, and owing to the poor condition of the road, is rather exciting. Through the kindness of friends of the Museum, we were given lodgings in the office building of a large sugar plantation at Cabañas. The miles upon miles of waving fields and the large factory where cane goes in and sugar comes out were interesting, but the important thing for us was the shore. Mangrove swamps were within walking distance and by hiring a sailboat for "whatever you would be pleased to give" (provided it was enough), we reached the strip of sandy beach at the mouth of the harbor. At the same time Messrs. William T. Davis and Charles E. Sleight were collecting on the Florida Keys just across the strait. They too were in mangrove swamps and on sandy beaches. Thanks to this arrangement as nearly an exact comparison as it seems possible to get can be made for this season of the year and these environments.

But the upland here is not the upland of Florida, so we returned to Havana and set out the next day for Pinar del Rio, capital of the province of the same name. The railroad nearly crosses the island in the low and relatively level province of Havana to get around the eastern ends of the mountains before it turns west. The ride to Pinar is through country largely given over to tobacco; by far the dominant tree is the royal



View from Rural Guard Quarters, Pinar del Rio, Cuba. The dominant tree is the royal palm

palm. Pines and palmettos were not seen in sufficient abundance to give us much hope of a close comparison with Florida, although the parklike aspect of the country, the grassland with scattered trees, was similar to what we wanted.

One of the pleasures of traveling on a scientific errand consists in finding so many friends of the work. Among such at Pinar was Dr. González Valez, who put his time entirely at our disposal and accompanying us on most of our trips acted as interpreter when our

Spanish failed. We profited by suggestions from Dr. Cuesta and by specimens from his collection, and Commandante Cepeda of the Rural Guards offered to do anything in his power — which was a great deal. Preliminary scoutings in the vicinity of the town confirmed the misgivings we had from views out of the car window. Collecting was poor and not Floridian. We therefore accepted the Commandante's offer of an army wagon to take us to Cerro Cabras or Goat Hill. An obliging soldier went with us and a negro muleteer whose

skill in handling his charges was exceeded only by the risks he took after we left the *carretera* or good road, for the *camino real* or "kings highway." At Cerro Cabras we found some pines and "live oaks" but not a Floridian topography. Compare this with what we found the next day — Floridian pines, palmettos and grasses on a



There is an automobile stage running from Pinar across the mountains to the north coast



a better comparison may be discovered in the future.

The problem for Mr. Leng and myself had now shifted slightly. Here was a sort of Cuban Florida and we had returned to the spot until new finds became relatively rare. If environment plays a large rôle in distribution, the fauna of the mountains, even though they be but a few miles distant, ought to differ more from the fauna of this spot than that of Florida does; whereas, if isolation or other factors are the important ones, the opposite would be found to be true. Fortunately there is an automobile

stage running from Pinar across

sandy level plain, stretching from about six miles south of the town into the distance as far as the eye could reach except toward the north. The insects also are far more Floridian than in the other places we had visited, even more so than near the coast within sight, figuratively speaking, of Key West from which the mountains now separated us however. Just how Floridian they are remains to be seen. We beat the insects and spiders off the trees into umbrellas; swept the vegetation with nets; chased the creatures flying in the blazing sun; chopped into logs and dug into the white, hot sand. At the same time Messrs. Sleight and Davis were doing the same thing in Florida. When the specimens have been labeled and classified we shall compare notes, but it can be said even now that were Cuba all like this a large percentage of the species would be common to both places. It is not to be understood that the fauna is identical with that of Florida. There were many Floridian species absent as well as non-Floridian species present — that is, although this locality is the most Floridian we found it is not an absolute copy and

the mountains to the north coast. Our first stop was at Baños San Vicente near Viñales. The mountains are largely limestone and full of caves, many of the caves containing streams. Cliffs rather than slopes are the characteristic thing and frequently the valleys are enormous sinks apparently caused by the falling in of the roofs of caves. The vegetation in this region is rich and distinctly more tropical than in those previously visited. Epiphytes of various species are common on the trees; orchids, delicate ferns and beautiful vines crowd every crevice in the rocks; but I do not recall seeing a single pine in this region — where we spent a pleasant profitable week and after each day's work refreshed ourselves in the warm sulphur baths from which the place gets its name.

Going still farther north, on the other side of the mountains, we found the remains of a large pine forest which had been destroyed by a hurricane three years ago. Because of the copper which is found here, this region is likely to become better known, but now it is practically uninhabited. Finally we reached the north shore and the man-



Mangrove swamps near Cabañas. Environmental conditions in the mangrove swamps of southern Florida appear to be identical with those found here. In coöperation with Messrs. William T. Davis and Charles E. Sleight collections were made in both places at the same time



Floridian pines, palmettos and grasses on a sandy level plain near Pinar del Rio. This is the Cuban locality which will offer the best comparison with the Floridian upland

groves much as at Cabañas. This furnished a second collection to compare with that from the Floridian coast.

Returning to Pinar we revisited the pine-palmetto region and then Mr. Leng went to Havana to study the Gundlach collection. This is without doubt the most complete collection of Cuban insects to be found in any one place in the world. They are in small glass-covered boxes tightly sealed with gummed paper. Gundlach was a most ardent collector and most of the entomological literature concerning Cuba is based on the material secured by him and his friend Poey. Part of Poey's collection is in Philadelphia but before it was sent Gundlach picked out for himself everything he did not already have. As the collection is thus of great historical value it is well that it is so carefully preserved, but since the specimens cannot be removed from their boxes, minute examination is impossible and much of it is useless for further study.

I went to Guane, the western terminus of the railroad. On account of the rains the road from the station to the town was out of commission and we had to drive four miles through fields, circling the town and coming in from the opposite side. The stage was small and crowded to its limit, the mules balked several times, the harness broke twice, and we were an hour and a half making the trip. The mountains at Guane are across the river from the town and as the river was swollen by recent rains I did not examine them. They appear to be of the same type as

at Viñales except that the peaks are isolated. Between showers I collected near the town in the grass fields containing scattered palmettos and other trees or bushes but no pines. When the time came to leave I still retained vivid memories of the stage ride from the station and also I wished to go early in order to collect from some flowers I had noticed near the railroad, so I arranged for a *coche particular*. I thought I was going to get a four-wheeled contraption of some sort but it turned out to be a cart, interesting in appearance and rather effective when it came to going across lots. If shaking is a remedy for a torpid liver, this cart, hitched to a pony of uncertain gait, is to be recommended.

Havana, clean clothes, and a good dinner with Dr. de la Torre and Mr. Leng were reached shortly after sunset. Mr. Leng left for New York the next day, but I remained in Havana and "helped" Dr. de la Torre pick out from his collection more than six hundred specimens of the rarest Cuban land shells as his gift to the Museum. These represented one hundred and thirty-nine species, most of which were not hitherto



The *coche particular*, a two-wheeled cart, hitched to a pony of uncertain gait



Frequently the valleys are enormous sinks apparently caused by the falling in of the roofs of caves

possessed by us. I then started for the east end of the island in order to visit Mr. Charles T. Ramsden and to get an idea of the conditions east of Havana.

Dr. de la Torre is convinced from his study of the land shells that Cuba is really three islands or groups of islands which have been joined either by an uplift or by the filling in of the separating channels. The mountains of Pinar del Rio are the remains of one, the province of Havana being the site of the channel which separated it from the middle island or group of islands and the Oriente or Santiago province is the third.

The run from Havana to Santiago takes at least twenty-four hours and since it was desirable to make as much as possible of the journey by day I stopped off at Zaza del Medio in the middle "island." The first night was spent in Zaza contrary to the advice of the station agent. Collecting was good the next day but that night I took a

train on the branch road to Sancti Spiritus and came back in the morning for the east bound train. I do not wish to disparage the accommodations at Zaza but the station agent was right. It is better to go to Sancti Spiritus to sleep. Waking moments there may be pleasantly spent listening to the band in the pretty plaza or viewing the several old churches, one of which is said to have been built early in the sixteenth century.

The ride to Santiago de Cuba had an interest, not met with previously, in that much of it was over a narrow way cut through liana-draped forests of mahogany and other tropical trees. Here and there are clearings almost all of which contain saw mills prophetic of the forest's doom. The train stopped at most of these clearings but occasionally an isolated homestead would flash by. At one, four men playing as nearly a real cricket game as four can, reminded the New Yorker that his countrymen

are not alone in the foreign invasion of Cuba although from Guane to Guantánamo baseball has become the game of the country.

Supper was eaten at Alto Cedro just before we took the dip down the mountains to the south shore at Santiago. The latter part of the journey was made in darkness but retraversed by day when going from Santiago to Guantánamo. At the latter place I was met by Mr. Ramsden and taken at once to the large sugar estate of which he is manager. Mr. Ramsden is a son of the British consul who was so helpful to Hobson's men after the sinking of the *Merrimac*. He is an ardent naturalist, having gathered together excellent collections of many groups of Cuban animals but especially of birds, land mollusks, butterflies and sphingid moths.

What is even more to the point, he knows what he has and the life of each in the field. He put horses and a trained negro assistant at my disposal for work during the day in the forest back of the cane fields and by night we collected the insects which came to the light as disregardful of the lights-out bell which rang at nine as I was of the rising bell which rang at four — interesting relics of slave days and even then, not meant for guests of the master.

Mr. Ramsden seemed surprised at the poor showing we had in butterflies. I was ashamed of it myself, but when the choice came to us between sitting down and getting fifty specimens of small things some of which are probably new to science and chasing over rocks and through thorns for a high-flying *Papilio* — beautiful though it was — we us-



Limestone caves in the mountains north of Vinales

ually let the *Papilio* fly. Mr. Ramsden, however gave the Museum more specimens and of rarer species than we could have procured by net.

With a collector's sigh over the much that was left undone in environments so different from those studied in the west and a personal regret in leaving the kind hospitality of Mr. and Mrs. Ramsden, I went back to Santiago — or "Cuba" as it is called there — and was soon rounding the water-level cavern of Morro on the way to the task of sorting

and getting the names of the ten thousand or more species brought back.

Cuba is rich in interesting forms and offers many scientifically important problems of distribution and the effect of isolation. Not until we know and understand Cuba, can we explain the fauna of Florida to the north or of the islands to the east of it. But the typical Cuban fauna is being rapidly exterminated by the inroads of short-sighted civilization and the scientific work must be done soon.



The castle of Morro near Santiago and its water-level cavern in the rocks

MAYA ART AND ITS DEVELOPMENT

REVIEW OF A NOTABLE WORK ON THE ARCHÆOLOGY OF THE PREHISTORIC MAYA RACE OF CENTRAL AMERICA¹

By George Grant MacCurdy

The following review is somewhat abbreviated from the very able discussion of the subject matter of Maya art which was courteously given to the JOURNAL by Dr. George Grant MacCurdy of Yale, soon after the publication of Dr. Spinden's work in 1913. Dr. MacCurdy's review will be found published in full in *Current Anthropological Literature* for July–September, 1913. Dr. Spinden's memoir on Maya art consists of the results of three years of recent study added to the work for his thesis for the degree of doctor of philosophy at Harvard University in 1909. The very notable contribution of the work lies along the line of time sequence of ruins which gives the book, although so recent in appearance, an authoritative rank in the research on prehistoric art in Yucatan.—THE EDITOR.

THE theory of an Old World origin for New World civilization is characterized by the Author as wild speculation. Neither is it likely that Maya civilization originated south of its recognized limits. While future studies may trace it in its humble beginnings to the coast region north of Vera Cruz, in "all essential and characteristic features it was developed on its own ground." From the accounts of the earliest European observers it appears that the golden age of Maya civilization long antedated the coming of the European. On the other hand the religious ideas embodied in the ancient culture, and the art of writing and of recording time still survived.

In any general treatment of Maya art much space should be given to the influence of the serpent, whose "trail is over all the civilizations of Central America and southern Mexico." Although the serpent is seldom represented realistically it is fairly certain that the rattlesnake (*Crotalus durissus*) was the chief model. . . . The alternation of quick and slow curves and the prevalence of tapering flamelike masses strike the dominant note in Maya art. They are

derived from a serpentine original, as are also the double outline to distinguish the ventral from the dorsal region and the series of small circles representing scales. A typical representation of the head and anterior portion of the body of the serpent includes nose, nose scroll, nose plug, upper incisor teeth, molar teeth, jaw, supraorbital plate, ear plug, ear ornament, curled fang, tongue, lower jaw, beard, lower incisor tooth, belly markings and back markings. With this as a key it is possible to interpret the more highly involved representations. The stamp of the serpent is also seen on various ceremonial objects, all of which are worthy of detailed study. . . .

After the serpent the jaguar received the most attention from Maya artists and priests. The Temple of the Jaguars at Chichen Itzá and the Jaguar Stairway at Copán are notable examples of the jaguar figure in architectural design, while the face of the jaguar is seen in many of the headdresses and breastplates. The rain gods (Chacs) took the form of jaguars, and jaguar priests held sway among the Maya. Nor was the jaguar cult limited to the Maya civilization. It is mirrored in the ceramic, stone and metal art of Costa Rica and Chiriqui,² far to the south of the most southern Maya cities.

¹ A STUDY OF MAYA ART, ITS SUBJECT MATTER AND HISTORICAL DEVELOPMENT. Herbert J. Spinden. With 286 illustrations in the text, 29 plates and map. Memoirs of the Peabody Museum of American Archaeology and Ethnology, Harvard University, vol. VI. Published by the Museum, Cambridge, 1913.

² A STUDY OF CHIRIQUIAN ANTIQUITIES. G. G. MacCurdy.

The artistic and ceremonial importance of birds and plumage in Maya art is very great. The figures range from realistic to vague and grotesque. The bird face tends on the one hand toward the serpent type and on the other toward the human as seen in glyphs. . . . The Author believes the anthropomorphic birds of the manuscripts to be minor deities, and notes a possible connection between the Roman-nosed god and a bird of some sort. He points out that the higher period glyphs, including the cycle, katun, and tun, commonly show birdlike noses. The hieroglyph for the month Kayab, once thought to be the head of a turtle, is shown to be the head of a macaw. The feather motive was frequently employed by Maya artists in drapery, headdresses, and even for moldings on the façades of buildings.

As for miscellaneous animal forms, usually with distinct human attributes, the turtle, snail and bat deserve especial mention. Shells are used independently as details of dress. The deer, dog and peccary are generally represented in more or less realistic form. The reviewer would call attention here to the parallelism existing between the principal Maya figures with mixed attributes and those of the Costa Rica-Chiriqui region, where the parrot god, the jaguar god, and the alligator (instead of the serpent) god reign supreme.

Symbols of death cast a shadow over Maya art, as seen in the codices, sculptures and even in architectural embellishment. Human sacrifice was not so appalling as among the Mexicans; there is however undeniable evidence of its existence. Among the death symbols may be noted skulls, skeletons, separate bones, the maggot symbol (a device resembling the percentage sign), dotted lines connecting small circles, black spots and closed eyes. The hieroglyphs of

the death god (God A) have been determined with accuracy. As for astronomical signs, the sun, the moon, the important planets and the more conspicuous constellations were represented. The sun symbol (normal kin sign) occurs frequently; the moon sign appears in the codices on terms of apparent equality with the kin sign. Few hieroglyphs have as yet been deciphered; only those connected with numbers and the calendar have been determined. . . .

Maya architecture is characterized by an elaborate grouping of the city as a whole, as seen to good advantage at Copán—a massive platform mound, with terraces and sunken courts; rising from the level of the platform mound are small pyramids crowned with temples, the principal mound overlooking a large plaza in which are set up stelæ. As a rule Maya cities are built upon level ground; but in some cases, as at Palenque for example, the assemblage of the city is modified by an accentuated topography.

The buildings seem to have been largely of a religious nature. The dwellings of the common people were probably similar to the huts still in use among the natives of Yucatan. In fact such huts are seen in fresco at Chichen Itzá. Between palace and temple there is no distinct line of demarcation. As regards elevation plans, one room was seldom placed directly over another, owing to the cumbersome method of construction. The ordinary wall construction is not true masonry, but a rough concrete faced with stone. Building stones were seldom cemented together, but mortar was extensively used for floors and as a thin coating on walls. The principle of the corbelled or false arch was doubtless understood by Maya builders. In all Maya vaults, "there is a projection of a few inches at the springing

of the vault on the inside," indicating that the arch was built over a wooden form. Maya roof structures are characterized by both the roof comb and the flying façade, the latter being the most common form of roof structure in northern Yucatan. The column, not found at all in the south, and the doorway are more or less closely associated. The cornice, taken in its broadest sense, is a special feature of Maya architecture. Gargoyles, used as waterspouts, occur at Copán. In façade decoration the mask panel plays an important rôle. While it may have originated in more than one way, the mask as a rule clearly represents the feathered serpent. Purely geometric motives occur on the buildings of northern Yucatan. These are seen not only as panels but also as string courses and all-over patterns.

The purpose of the great monolithic monuments or stelæ is uncertain. Whatever their significance, they admit of classification architecturally into independent and auxiliary or temple stelæ. While stelæ occur at nearly all the ruins of the south and west, only one has been noted at Palenque. The altar was particularly developed at Copán and Quirigua. The most widespread type is drum-shaped, and may have originally represented a bundle. The more elaborate altars are characterized by animal motives. There are still many vestiges of color to show that the Maya painted not only their stone buildings but also their sculptures.

Ceramics often affords the chief evidence bearing on the art of a people. Among the Maya however, ceramics was overshadowed by architecture. As everywhere else on the western hemisphere, pottery was shaped by hand. Some use was made of a block turned by heel and toe, but this is not the true potter's wheel. Pottery of a fine black

or red paste with incised decorations was the most common type. Stamp decorations are unusual while figures in relief are frequently met with, as are also zoö-morphic and phytomorphic forms. Polychrome vessels of painted ware may be classed as the gems of ceramic art.

Jadeite and other semiprecious stones were extensively used in the making of amulets and various small carved objects, the most noteworthy of which is the so-called Leiden Plate with the "incised figure of an elaborately attired human being holding a Ceremonial Bar" on one side and a column of hieroglyphs on the other. Objects of metal, although rare, evince a skill fully equal to the metal work of the Isthmus or the Valley of Mexico. Light on Maya textile art may be had from a study of the monuments.

Artistically the three Maya codices are of unequal merit; the Dresden is easily the best. But for its fragmentary condition Codex Peresianus would rank with the Dresden Codex. Both antedate the coming of the Spaniards by many centuries. The Tro-Cortesianus is of inferior workmanship and belongs to a later date. Attempts at decipherment have been many, the most important single contribution being Förstemann's *Commentary on the Dresden Codex*. All three manuscripts deal largely with religious and astronomical matters; Codex Tro-Cortesianus in addition casts much light on things of everyday life.

The Author's contributions to chronological sequence are noteworthy. His method is to take up one city at a time beginning with the most archaic. He attempts to throw into its proper chronological sequence the mass of sculpture on stelæ, altars and the façade as well as interior decorations of the temples. . . . Tikal is believed to be one of the first Maya cities to become a center of art

and culture. Quirigua, not far from Copán, flourished after the passing of the archaic period, that is, after the fifteenth katun.

"Naranjo started well, but remained stagnant during the period from the fifteenth to the eighteenth katun, which was the most brilliant period in Copán and Quirigua." . . . While the dates at Yaxchilan are early, none seem to reach as far back as the archaic period. The little known but important city of Piedras Negras is believed by the Author to have flourished after the fifteenth katun. . . . The buildings are in such an advanced stage of ruin as to make an architectural study unavailing. Palenque, long famous for its temples and sculptured tablets, is still to be fully explored. The lack of easily worked stone led to the use of stucco as an art medium. The finest modeling known to Maya art is seen in the stucco work of Palenque. Here the handling of the pure profile is seen at its best and the anatomy of the human body is rendered with a fidelity unknown to other Maya cities. Palenque belonged to a late period; and contributed much toward the development of the roof structure, the sanctuary and the portico. Here also are to be seen "the widest rooms, the thinnest walls, the most refined shapes and the most ideal interior arrangements to be found anywhere in the southern and western part of the Maya area." Palenque is classed among the latest cities of the first great epoch of Maya culture.

Comalcalco and Ocosingo both resemble Palenque in respect to art and architecture. For the most part the highland ruins of Guatemala and the state of Chiapas are subsequent to the great period of Maya art.

The stage of the second great age of Maya civilization shifts to northern Yucatan. As Copán furnished the key

to the chronology of the south, so Chichen Itzá does to that of the north. It was probably the first great northern city to be founded and the last to fall. The only initial series date thus far found in the north is from Chichen Itzá. For the north the Author takes up seriatim periods instead of cities and distinguishes the following: (1) Period of transition; (2) League of Mayapan; (3) Influence from the Valley of Mexico; and (4) Fall of Mayapan to the present time. The second and third periods constitute the second great age of Maya civilization.

Notable achievements in architecture mark the period of the League of Mayapan. Most of the structures at Uxmal, Labna, Kabah, Sayil, Hochob, and Chacmultun belong to this period; as do also the Akat'eib, Casa Colorado, Group of the Monjas, and the Carocol at Chichen Itzá. Nahua influence was strongly felt during the next period, leaving its imprint especially at Chichen Itzá, where Nahua features are prominent as in the Temple of the Initial Series, Castillo, Ball Court Group, and Group of the Columns. The architectural features mentioned by the Author as probably of Nahua origin include serpent columns and balustrades, platform mounds with colonnades, flat roofs, ball courts, and atlantean supports; the artistic and religious features comprise Chacmool sculptures, sun disks and the celestial eye type of star symbols, speech signs, feathered monsters in front view, and processional grouping of warriors accompanied by identifying glyphs.

There have been numerous attempts to correlate Christian and Maya chronology. These have been for the most part based on the Books of Chilán Balam. The Author's concordance, which is presented in the form of a table, may be briefly summed up as follows: Proto-historic period, 235 B. C. to 160 A. D.;

Archaic period, 160 A. D. to 455 A. D.;
Great period, 455 A. D. to 600 A. D.;
Transition period, 600 A. D. to 960 A. D.;
League period 960 A. D. to 1195 A. D.;
Nahua period, 1195 A. D. to 1442 A. D.;
Modern period, since 1442 A. D.

The relation of Maya to neighboring cultures receives interesting treatment. That an elaborate calendar system was used with comparatively little change from the Tarascans and Otomies on the north to the tribes of Nicaragua on the south points conclusively to ethnic affiliations throughout the region. This calendar however was invented and largely perfected by the Maya. Gadow points out that five of the animals represented as day signs in the Aztec calendar do not occur on the highlands of Mexico; it is therefore reasonable to suppose that the calendar did not originate in that region. On the other hand all of the animals connected with the calendar are common to the Maya country.

Following a résumé of the chronological sequence of cultures in Mexico, the Author finds no grounds for ascribing a northern origin to Maya art. The earliest period of the north is entirely independent of the Maya; the middle period in the highlands of Mexico was one of low art pressure and received a current from the south; and only in the last decadent period was this current reversed.

As for cultural connections outside of Mexico, the argument centers principally around: (1) Pyramids and other features of material culture; (2) reli-

gious ideas associated with the serpent; and (3) similarities in symbolism and art. The Author does not even "dignify by refutation the numerous empty theories of ethnic connections between Central America and the Old World."

In the New World are three large but widely separated areas where pyramids are found: western Peru and Ecuador, Central America and Mexico, and the Mississippi valley and the southeastern part of the United States, but there is little to suggest interrelation. Of the various types of mounds in the Mississippi valley the pyramid is the only one that offers points of resemblance; but points equally striking are offered by the great structure at Moche, Peru, or even by the ruins at Tello, Chaldea; Central American and Mexican influence has likewise been invoked to account for the symbolism on the shell gorgets and copper plates from the Mississippi Valley; the Author would account for them in other ways, believing as he does that there are "no trustworthy evidences of trade relations between the Mexicans and Mound-builders, nor is there any sure indication of fundamental unity of culture at any time in the distant past."

Dr. Spinden's work reflects credit upon his *alma mater* as well as the museum he now serves. It should be welcomed by the specialist for the new light it throws on hitherto obscure pages and by the layman as an up-to-date and conservative presentation of a subject that cannot fail to appeal to all lovers of American aboriginal art.



THE FIRST WILD ASS BROUGHT INTO THE CAMP

We tracked this animal for several hours. The wild ass travels long distances at night for water, sometimes twenty miles or more and back to its feeding grounds. Near the coast in Somaliland, a country of volcanic rock and sand



Caravan traveling up a dry river bed

THE WILD ASS OF SOMALILAND

A STORY OF HUNTING IN DESERT AFRICA

By Carl E. Akeley

With photographs by the Author

SCARCITY of camels was likely to delay our start from Berbera to the interior of Somaliland for some time, therefore it was decided to put in the time of waiting in hunting the wild ass down in Gubon country. Thus we traveled across the arid plain from Berbera through a pass in the Golis Range on over the volcanic rock and barren sands to a wet spot in a dry river bed that would produce water for camp when properly coaxed. We made our wild ass camp thirty miles from Berbera in a cheerless country, rocks and sand having all the appearance of being freshly dumped in this God-forsaken place, storing up heat from a fierce vertical sun all day and throwing it off at night.

After several heart-breaking days' work we had secured but one specimen and several were needed for a group. One morning under guidance of natives who promised to take us to a country where they abounded, D. and I started out at three o'clock in the morning, with a couple of camels to bring back the skins if we got them. At about eight as we were crossing a sandy plain where here and there a dwarfed shrub or tuft of grass had managed to find sustenance,

one of the gun-bearers pointed out in the distance an object which he declared to be an ass. We advanced slowly. As there was no cover, there was no possibility of a stalk, and the chance of a shot at reasonable range seemed remote, for we had found in our previous experience that the wild ass is extremely shy and that when once alarmed travels rapidly and long distances. We approached to within two hundred yards and had begun to think that it was a native's tame donkey and expected to see its owner appear in the neighborhood, when it became uneasy and started to bolt; but its curiosity brought it about for a last look and we took advantage of the opportunity and fired. It was hard hit apparently, but recovered and stood facing us. We approached closer and thinking it best to take no chances fired again — and then he merely walked about a little making no apparent effort to go away. We approached carefully. He showed no signs of fear and although "hard hit" stood stolidly until at last I put one hand on his withers and tripping him, pushed him over. I began to feel that if this was sport I should never be a sportsman.

We now discovered that our scant supply of water was exhausted and although we wished to continue the hunt we realized that to get farther from camp without water would be risky indeed. The guide had assured us that there would be plenty of opportunity to get water on our route but we knew that it was five hours back to water, the way we had come, and five hours without water in the middle of the day would mean torture. It is said that in that region thirty hours without water means death to the native and twelve hours is the white man's limit. The guide assured us that if we would continue on an hour longer we would find water. After four hours of hard hot marching we arrived at a hole in the ground where some time there had been water but not a drop now and after a little digging at the bottom of the hole the natives declared there was no hope. Our trail for the last hour had been under a pitiless noonday sun along a narrow valley shut in on either side by steep rocky hills, while we faced a veritable sand storm, a strong hot wind that drove the burning sand into our faces and hands. The dry well was the last straw.

The guides said there was one more hole about an hour away and they would go and see if there was water there. They with the gun-bearers started out, while we off-saddled the mules and using the saddles for pillows and the saddle blankets to protect our faces from the driving sand, dozed in the scant shade of a leafless thorn tree.

At four o'clock the boys returned — no water. D. and I received the report, looked at one another and returned to our pillows beneath the saddle blankets. A little later a continued prodding in the ribs from my gun-bearer brought me to attention again as he pointed out an approaching caravan consisting of sev-

eral camels and a couple of natives. Each of the natives carried a well-filled goatskin from his shoulders and realizing that these goatskins probably contained milk, I knew that our troubles were nearly over. I instructed the gun-bearer to make a bargain for part of the milk and covered my head again to escape the pelting of the sand and waited.

We were both in a semi-comatose state and I paid no further attention to proceedings until I was again prodded by the gun-bearer who was now greatly excited. He pointed to the receding camels while he jabbered away to the effect that the natives would not part with any of the plentiful supply of milk. The white men might die for all they cared.

When I had come to a realization of the situation, there seemed to be only one solution to the affair — a perfectly natural solution — precisely the same as if they had stood over us with their spears poised at our hearts. I grabbed my rifle and drew a bead on one of the departing men and called to D. to get up and cover the other. I waited while D. was getting to an understanding of the game and then when he was ready and I was about to give the word the natives stopped, gesticulating wildly. The gun-bearer who had been shouting to them told us not to shoot, that the milk would come, and it did. Milk! Originally milked into a dung-lined smoked *chattie*, soured and carried in a filthy old goatskin for hours in the hot sun. But it was good. I have never had a finer drink.

An hour before sundown, greatly refreshed, we started back to camp. Just at dusk the shadowy forms of five asses dashed across our path fifty yards away and we heard a bullet strike as we took a snap at them. One began to lag



Stripes on the neck revealed by the camera



A water hole in Somaliland. Water is obtained by digging down in the sand of a dry river bed to the underlying rock



SOMALI GIRLS LOADING WATER CHATTIES ON A CAMEL

behind as the others ran wildly away. The one soon stopped and we approached, keeping him covered in case he attempted to bolt. As we got near he turned and faced us with great gentle eyes. Without the least sign of fear or anger he seemed to wonder why we had harmed him.

The only wound was from a small bullet high in the neck, merely a flesh wound which would have caused him no serious trouble had he continued with the herd. We walked around him within six feet and I almost believe we could have put a halter on him. Certainly it

would have been child's play to have thrown a rope over his head. We reached camp about midnight and I announced that if any more wild asses were wanted, some one else would have to shoot them. I had had quite enough. Normally the ass is one of the wildest of creatures and it is difficult to explain the actions of these two. They appeared not to realize that we were the cause of their injuries but rather seemed to expect relief as we approached — and yet one English "sportsman" boasted of having killed twenty-eight.



Young male wild ass. Mounted by Carl E. Akeley in Field Museum, Chicago. Thus brought from the far African jungle, it is made to "live" for the people of America

MUSEUM NOTES

SINCE the last issue of the JOURNAL the following persons have been elected to membership in the Museum:

Sustaining Members, MRS. ALLEN S. APGAR and MRS. L. W. FABER;

Life Members, MRS. SAMUEL QUINCY, MRS. GEORGE H. RICHARDSON, MISS M. ELIZA AUDUBON, MISS CORNELIA PRIME and MESSRS. D. EVERETT WAID and NORTON PERKINS;

Annual Members, MRS. NICHOLAS BIDDLE, MRS. GEORGE P. BLACK, MRS. LLOYD BRYCE, MRS. ELMER E. COOLEY, MRS. EVELYN A. CREGIN, MRS. WILLIAM K. DRAPER, MME. F. G. FARA FORNI, MRS. H. HIRSCH, MRS. CHARLES E. O'HARA, MRS. LEONIE M. SCOTT, MRS. J. SPENCER TURNER, MISS CLARA J. BENEDICT, MISS GERTRUDE PARSONS, DR. SARAH BELCHER HARDY, DR. HARRIS KENNEDY, DR. CHARLES H. PECK, DR. JOHN B. WALKER, CAPT. C. P. RADCLIFFE DUGMORE and MESSRS. JOHN F. ARCHBOLD, GEORGE P. BLACK, JOSEPH A. BLAKE, JR., EDWARD BORN, CHARLES HILTON BROWN, GEORGE J. CHAMBERS, FREDERIC A. DALLETT, ARTHUR DUBOIS, FREDERICK S. DUNCAN, THOMAS F. GILROY, JR., E. LLEWELLYN HARPER, ALBERT HERTER, FREDERIC C. MILLS, LOUIS M. MOMS, F. PALMER PAGE, F. LOUIS PALMIERI, ROBERT PARISER, IRA A. PLACE, ORLANDO B. POTTER, R. BURNSIDE POTTER, JOHN QUINN, H. SANDHAGEN, BERNARD SCHUTZ and ADOLPH SCHWOB.

PROFESSOR HENRY FAIRFIELD OSBORN delivered the Hitchcock Lectures at the University of California on "Men of the Old Stone Age: Their Environment, Life and Art." The five lectures occupied successive afternoons from February 16 to 20.

In the course of his journey through California, Professor Osborn revisited the famous deposits of Rancho La Brea, where collections are being made on a very large scale for the Museum of History, Science and Art of Los Angeles, under the supervision of Director Frank S. Daggett, and with the coöperation of Messrs. Merriam, Fisher and Miller. A complete series of mounted specimens, representing this entire fauna, will undoubtedly be secured for the Los Angeles Museum. At the same time the much-heralded discoveries of human remains at Rancho La Brea were made, and the conditions of the discoveries

were carefully studied by Professor Osborn and Professor John C. Merriam of the University of California. The results will be published in due time by Director Daggett and Professor Merriam.

THE HITCHCOCK LECTURES on "Men of the Old Stone Age" will be repeated at Columbia University on successive afternoons, April 13 to 17, Havemeyer Hall, at 4:15. The subjects are as follows:

- I — The Origin of Man
- II — The Three Oldest Races
- III — The Neanderthal Race
- IV — Culture and Appearance of the Cro-Magnon Race
- V — Art of the Cro-Magnon Race

These lectures will be published in the autumn by Scribner's under the same title.

THE CONGO EXPEDITION under Messrs. Herbert Lang and James Chapin, which in coöperation with the Belgian Government has been carrying on active field work in central Africa for the past four years, is now devoting its entire attention to the shipment of its collections. A letter written by Mr. Chapin at Avakubi on January 12 states "that the task of transporting to Stanleyville the collections deposited at Avakubi has been completed and that fifty loads, as well, of those from Medje have likewise been forwarded to Stanleyville, where all our caravans are reported to have arrived without the slightest mishap. To insure the greatest security, each was accompanied by one of our native assistants. The recruitment of porters here offers considerable difficulty, as this post is on the main road between Stanleyville and the Uganda frontier and the needs of the station itself are therefore great; but the State officials have always assisted us in the most cordial manner and the work has progressed steadily and successfully. Up to the present date 637 porters have been sent off, as well as nine large canoes, the contents of which would represent loads for at least 180 men, by way of the Aruwimi River."

It is expected that the expedition will reach New York early in the summer. Neither Mr. Lang nor Mr. Chapin has been ill one day during a four years' sojourn in the tropics and they have gathered together probably the most extensive and valuable collection of the Congo

fauna ever assembled. When added to what the Museum already possesses through earlier expeditions to Africa, the African collections will no longer need large additions and field work in Africa will be discontinued for the present.

THROUGH the generosity of the Carnegie Institution of Washington, the library of the American Museum now possesses a complete set of Carnegie Institution publications numbering two hundred volumes. The subjects include archæology, astronomy, botany, economics, engineering, geology, history, literature, mathematics, medicine and zoölogy.

MR. PAUL J. RAINEY has presented to the Museum forty-five mammals from Africa, including twelve lions, adult and young. One of the lions, an old black male, is an unusually fine specimen, distinguished by the exceptional black color and by the size of the mane which grew far back on the body. This is probably the finest specimen of a wild lion in existence. It will be used as a leader for the lion group for the proposed African hall and completes the series of specimens for that group.

THE Museum has purchased from Dr. E. Gaffron, Berlin, his entire collection of prehistoric objects from the cemetery in Nasca, Peru. The collection consists of some four hundred beautifully decorated pottery vessels and several hundred other objects, and was made for Dr. Gaffron in 1907 by Mr. F. W. Vollmann, through whom the purchase has been accomplished.

SOME of the most interesting of the casts from the Otto Finsch collection on exhibition in the South Sea Island hall have been installed in the archæological hall to illustrate important racial types of the natives of the South Sea Islands. The races shown are Tasmanian, Papuan, Melanesian and Malay. Among the casts the Tasmanian is of the greatest importance as there is no longer a living representative of the race, the last Tasmanian having died in 1876. The American Museum cast is from the original in the Sydney Museum, Australia.

THE Museum has acquired from the estate of the late Edwin E. Howell of Washington, a well known collector and dealer along the lines of several natural history subjects, the

entire collection of meteorites which belonged to his establishment at the time of his death. The collection consists of representatives of fifty-four falls and finds, aggregating about one hundred kilometers in weight and containing several desirable additions to the Museum's series. It includes two which have not been heretofore represented, namely the Ainsworth and Williamstown irons. This acquisition was made possible through the generosity of Mr. J. P. Morgan.

MR. AMOS ONE ROAD, or to call him by his real Indian name, Jingling Cloud, proved an interesting and interested visitor at the Museum. This young Wahpeton Sioux is in the city studying in the Bible Teachers' Training School. Although only twenty-six years of age he has a surprising amount of knowledge concerning the customs of the Eastern Dakotas. Accordingly Mr. Alanson Skinner and Dr. Robert H. Lowie found it profitable to take down from his dictation notes on many subjects of ethnological interest such as war customs, terms of relationship, social usages and ceremonials.

THE department of ornithology has recently received an unusually rich collection of birds from Mr. W. B. Richardson, who has been collecting birds and mammals in Ecuador for the Museum. The collection comprises about thirteen hundred specimens representing fully three hundred and seventy species, many of which are new to the Museum collection.

A NUMBER of new exhibits dealing with insect-borne diseases have been installed in the hall of public health. These include first, a series of insect-carriers of disease mounted under magnifying glasses; second, a model of a pier protected against the landing of rats from plague-infected ships; third, a model of a rat-killing squad in San Francisco and fourth, various maps showing methods of drainage for the prevention of malaria. Specimens of ticks and tsetse flies which carry disease have been furnished for this exhibit by the British Museum and a series of California ground squirrels (carriers of the plague bacillus) have been presented by the United States Public Health Service.

DR. C.-E. A. WINSLOW is engaged in an investigation of sanitary conditions for the Home Office of the Metropolitan Life Insur-

ance Company and has also been appointed advisory expert in public health education in the New York State Health Department, which is being organized by Dr. Hermann M. Biggs, the new Commissioner.

SOME one hundred and thirty specimens of minerals were added to the mineral collection in the American Museum during the year 1913. In preponderant measure it was the Bruce fund that made this generous increase possible. Among the additions the following are conspicuous: a wonderfully crystallized surface of hopeite (phosphate of zinc) from South Africa, a beautifully crystallized plate of gold from Oregon, and a small series of phenomenal cuprodesclizites. Hopeites have seldom appeared in a collection before except in fragments and with very small crystals. The splendid surface of crystals of the new specimen arrests attention. South Africa and Madagascar are giving to the mineral collectors of the world some great surprises. Hardly less remarkable however is the new find in Bisbee, Arizona, of cuprodesclizite. Almost all collectors will recall that specimens of this mineral have hitherto been poor and scarcely recognizable. This new find reveals it in dark velvet surfaces composed of minute needles of extreme beauty.

THERE has been placed on exhibition in the hall of fishes, a model of one of the Atlantic flying fishes which is the first of this interesting group to be shown by the Museum. Flying fishes abound in the warm seas of the world. Their enlarged fins enable them to remain in the air for surprisingly long flights—under favorable circumstances an eighth of a mile or more—and in this way they doubtless often escape off-shore dolphins and bonitos of which they are the principal food.

The skin of the boarfish has been mounted and placed on exhibition also. This is a flat squarish fish (*Antigonia*) of a beautiful red color, is widely distributed in rather deep water in the tropics and belongs to a small family with no near allies, the correct classification of which has always been a puzzle to naturalists.

THE Museum has come into the possession of a skeleton of the pygmy right whale *Neobalæna marginata*. This species is exceedingly rare and is found only in the waters about New Zealand. It presents characters

common to both right whales and fin whales, with most extraordinary individual peculiarities. These relate chiefly to the ribs which are more numerous than in other whales and are flat strips of bone seven or eight inches in breadth. It is also interesting because of the small number of lumbar vertebrae. This whale is without doubt one of the most important living cetaceans.

Professor Dollo recently read a paper in London in which he expressed the view that *Neobalæna marginata* presents an extraordinary case of convergence and that while resembling the right whale in many superficial ways it still is closely allied to the fin whales. Whether or not upon further study of the species Professor Dollo's views will be sustained remains to be seen.

THE department of geology has received from Mr. D. M. Barringer of Philadelphia, through the courtesy of Princeton University, the loan of an important exhibit illustrating the surface features, structure and theory of origin of Meteor Crater in Arizona. Meteor Crater is the name now applied to the hill and depression in Arizona which formerly went by the name of Coon Butte. The locality is about ten miles southwest of Cañon Diablo, a station on the Santa Fé Railroad.

The investigations of Mr. Barringer and others have led to the increasing adoption of the theory that this crater-like depression in the plateau was formed by the impact of a large mass or assemblage of masses of meteoritic iron. The depression is about 4200 feet in diameter and its present bottom is 570 feet below the highest point of its rim or about 450 feet below the surface of the plateau. Explorations made by the diamond drill show that the bolide which caused the depression penetrated to a depth nearly 700 feet farther.

The exhibit consists of photographs, charts, records of analysis, specimens of the rock which was pulverized and fused by the impact of the meteorite, numerous fragments of the meteorite itself, bolls formed by the oxidation of portions of the iron as they lay imbedded in the debris, specimens of the undisturbed rocks from the vicinity of the crater and samples of the drill cores from the beds beneath those which were altered or tilted out of position when the meteorite struck the earth. The whole exhibit forms a most interesting contribution to the history of the association of meteorites with the earth.

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The Museum is open free to the public on every day in the year.

The American Museum of Natural History was established in 1869 to promote the Natural Sciences and to diffuse a general knowledge of them among the people, and it is in cordial coöperation with all similar institutions throughout the world. The Museum authorities are dependent upon private subscriptions and the dues from members for procuring needed additions to the collections and for carrying on explorations in America and other parts of the world. The membership fees are,

Annual Members.....	\$ 10	Fellows.....	\$ 500
Sustaining Members (annually)....	25	Patrons.....	1000
Life Members.....	100	Associate Benefactors.....	10,000
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The Museum Library contains more than 60,000 volumes with a good working collection of publications issued by scientific institutions and societies in this country and abroad. The library is open to the public for reference daily — Sundays and holidays excepted — from 9 A. M. to 5 P. M.

The Museum Publications are issued in six series: *Memoirs, Bulletin, Anthropological Papers, American Museum Journal, Guide Leaflets and Annual Report*. Information concerning their sale may be obtained at the Museum library.

Guides for Study of Exhibits are provided on request by the department of public education. Teachers wishing to bring classes should write or telephone the department for an appointment, specifying the collection to be studied. Lectures to classes may also be arranged for. In all cases the best results are obtained with small groups of children.

Workrooms and Storage Collections may be visited by persons presenting membership tickets. The storage collections are open to all persons desiring to examine specimens for special study. Applications should be made at the information desk.

The Mitla Restaurant in the east basement is reached by the elevator and is open from 12 to 5 on all days except Sundays. Afternoon Tea is served from 2 to 5. The Mitla room is of unusual interest as an exhibition hall being an exact reproduction of temple ruins at Mitla, Mexico.

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Professor Albert S. Bickmore, Trustee of the American Museum

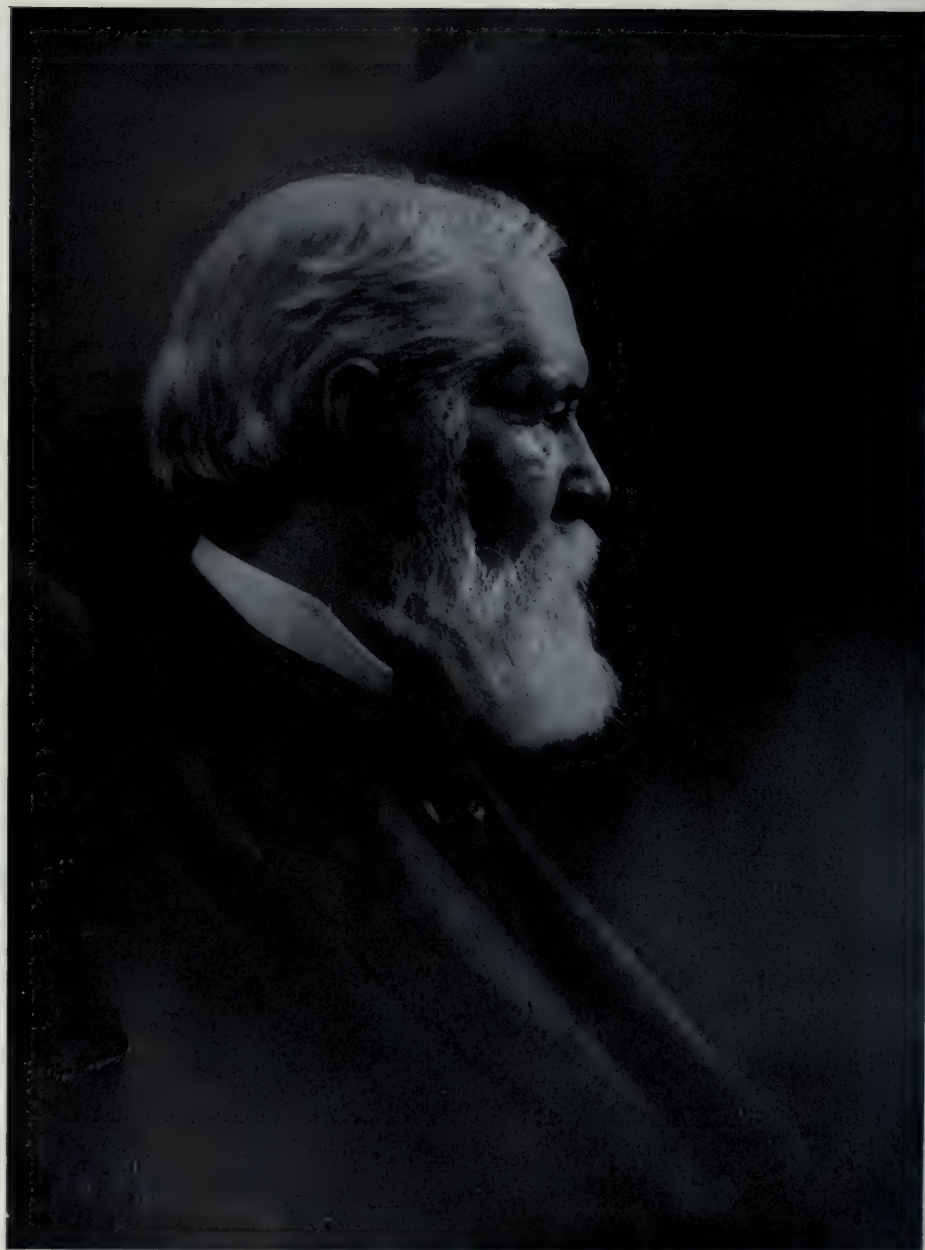
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MARY CYNTHIA DICKERSON, *Editor*

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PROFESSOR ALBERT S. BICKMORE

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THE AMERICAN BEAVER

THE NEW BEAVER GROUP IN THE AMERICAN MUSEUM— AND BEAVERS IN GENERAL

By Frederic A. Lucas

IT is not without diffidence that we announce the completion of a beaver group, for fear lest our critical friends should ask why it is that such an interesting and important animal was not long ago represented in an institution bearing the name of the American Museum of Natural History. For the beaver is one of the most characteristic, most interesting and most widely distributed of North American mammals and time was when it was the most important. As Merriam writes in the *Mammals of the Adirondacks*: "No animal has figured more prominently in the affairs of any nation than has the beaver in the early history of the New World. Its influence on the exploration, colonization and settlement of this country was very great. The trade in its peltries proved a source of competition and strife, not only among the local merchants, but also among the several colonies, disputes over the boundaries having frequently arisen from this cause alone." And if it is not endowed with the almost human skill and intelligence we were brought up to believe that it possessed, its keen instincts and engineering ability may well excite our admiration and respect.

The former importance of the beaver was due to its use in the manufacture of the fashionable, expensive and cumbersome beaver hat, a species among hats

almost as extinct as the great auk among birds, and like it known to the present generation mainly from specimens preserved in museums. A variety however still survives in Wales, which was also the last abiding place of the beaver in Britain. In one of its many forms it is seen in the familiar portrait of Pocahontas, and it will probably survive for generations to come in the cartoonists' "Uncle Sam," whose dress would be incomplete without the bell-crowned beaver hat.

It is just possible that in days gone by the beaver hat may have been worn for other reasons than simply to keep the head warm. Almost every natural product was supposed to be endowed with some malign or beneficent property and the beaver hat was guaranteed to cure deafness and stimulate the memory.

Trade in beaver skins began early, almost with the founding of the first colonies. In 1624 the Dutch shipped four hundred skins from New Amsterdam; by 1635 the number had increased to nearly fifteen thousand — 14,981, to be exact, and the beaver was deemed of sufficient importance to be adopted as the seal of the colony. Albany — Fort Orange it was in those days — was the headquarters of the Dutch fur trade, and from there it went to the French at Montreal, only somewhat later to pass to the English.

An interesting feature of the early

trade is that for hat-making, old and worn beaver skins were preferred to new and in 1636 Bradford in his *History of Plymouth Plantation* notes that coat beavers, as they were termed, brought twenty to twenty-four shillings the pound, others selling for fifteen to sixteen shillings the skin. As Adrian van der Donck wrote, "unless the beaver has been worn, and is greasy and dirty, it will not felt properly"; so whenever possible, the Indians were wheedled or cozened out of their robes and these went into the making of hats. The hats

of those days were valuable and cherished possessions, of sufficient importance and endurance to be handed down by will from father to son. Also they could be rented by the year for about fifteen dollars by those who could not afford to purchase outright. All of which shows that Dame Fashion was not so fickle in those days as now.

The English colonist did not neglect the beaver. The "Fortune," the first ship to visit Plymouth, took back in 1621 two hogshheads of beaver and other pelts, and in 1634 Winslow sent twenty



Copyright, 1914, by the National Geographic Society

The beaver hat still survives in Wales as part of the national costume. Photograph reproduced through the courtesy of the National Geographic Society, Washington, D. C.

hogsheads, the shipments up to this time having a total value of about ten thousand dollars. Thus the beaver seems to have been for a time the chief source of revenue of the Plymouth colony, although it is evident from the records that many of the skins must have come from Maine. But in New England, outside of Maine, the beaver was not abundant, and by 1645 the trade in the skins was practically at an end in that section. As any part of the country became settled the trade in beaver skins increased, and as fast as the beaver was exterminated, it became necessary to go farther and farther into the interior in search of it. Here is where the Hudson's Bay Company played the leading rôle, and by virtue of its efficient organization captured from the French and Dutch the fur trade that it has held even to the present day. A few figures will suffice to indicate the number of beavers that have been, and still are, used in trade. In 1854 the Hudson's Bay Company disposed of no less than 509,240 skins, although this doubtless represents the accumulation of several years. In 1891 the Company handled 63,419 skins ranging in price, according to size and quality, from five to sixty-nine shillings apiece, and even so recently as 1903, 80,000 skins were sold in London, although 16,504 were sold by parties other than the Hudson's Bay Company. The profits on some of these skins must have

been fairly good, especially on the ones taken in exchange for trade muskets. The price of one of these flintlock guns was enough beaver skins piled about the gun standing on end to reach from floor to muzzle. The gun too, apparently was subject to unexpected growth, and for a year or two would be about six inches longer than the would-be-purchaser had calculated. Transactions such as this were the exception however, and the list price for a beaver skin was ten shillings.

The fur trade nevertheless has not been all profit, and there have been times when the market was glutted and prices low. Such a time came in 1700, when there was a large stock of skins on hand, and just as in our day, planters have burned tobacco in the effort to keep up prices, so three-quarters of the skins on hand were burned at Montreal.

The principal use of these skins was,



Grandfather's hat, 1830. . From a specimen in the Museum of the Essex Institute, Salem



THE NEW BEAVER GROUP IN THE AMERICAN MUSEUM

This shows the work and home life of the beaver. The old beavers are cutting trees for food and for building dams and houses. In the foreground is a house with part torn away to show the little beavers within. Designed and prepared by Albert E. Butler, animals mounted by Walter Escherich. The background by Hobart Nichols shows a pond and the ancient beaver dam that made it. The scene is in Estes Park, Colorado, with Lily Mountain in the distance



The beavers have brought a supply of tree trunks and boughs to repair the break in the dam and thus save the pond

as previously noted, for the making of hats, and as these hats were worn in ever increasing numbers from 1100 onwards until the invention of the silk hat, it seems quite probable that the beaver hat was the cause of the practical extermination of the beaver in Europe.

About 1840 as the number of beavers was getting low and the price for their skins correspondingly high, the big South American water rat, or coypu, known to the trade as "nutria," came to their aid. The fur of these animals felted just as well and cost much less, and they were imported by thousands. The silk hat

however, was their real salvation; this, the hall mark of the well-dressed man, is said to have reached Paris about 1825, although it was known in Florence at least fifty years earlier.

The beavers gained a new lease of life from the introduction of the silk hat. It rapidly came into vogue and the price of beaver skins declined to a point where trapping was no longer profitable, and for a time the animal increased and multiplied. The drop in price may be realized by saying that in 1869 skins were offered by the bale as low as twenty-five cents apiece.



This old beaver house has been used for many years. It is thirty-five feet in diameter and is so overgrown with grass and willows as to resemble a small island. It is one of the many structures of various ages and types of beaver architecture found in the string of ponds shown on the following page



Young beavers at home. Part of the new group recently constructed in the American Museum

Then came the use of plucked beaver for furs and this demand of fashion has kept down the number of beavers ever since. If we Americans were not a wasteful, improvident, lawless nation, there would be little trouble in supplying all the beaver skins necessary, and there is small doubt that this will eventually be done. With proper restrictions



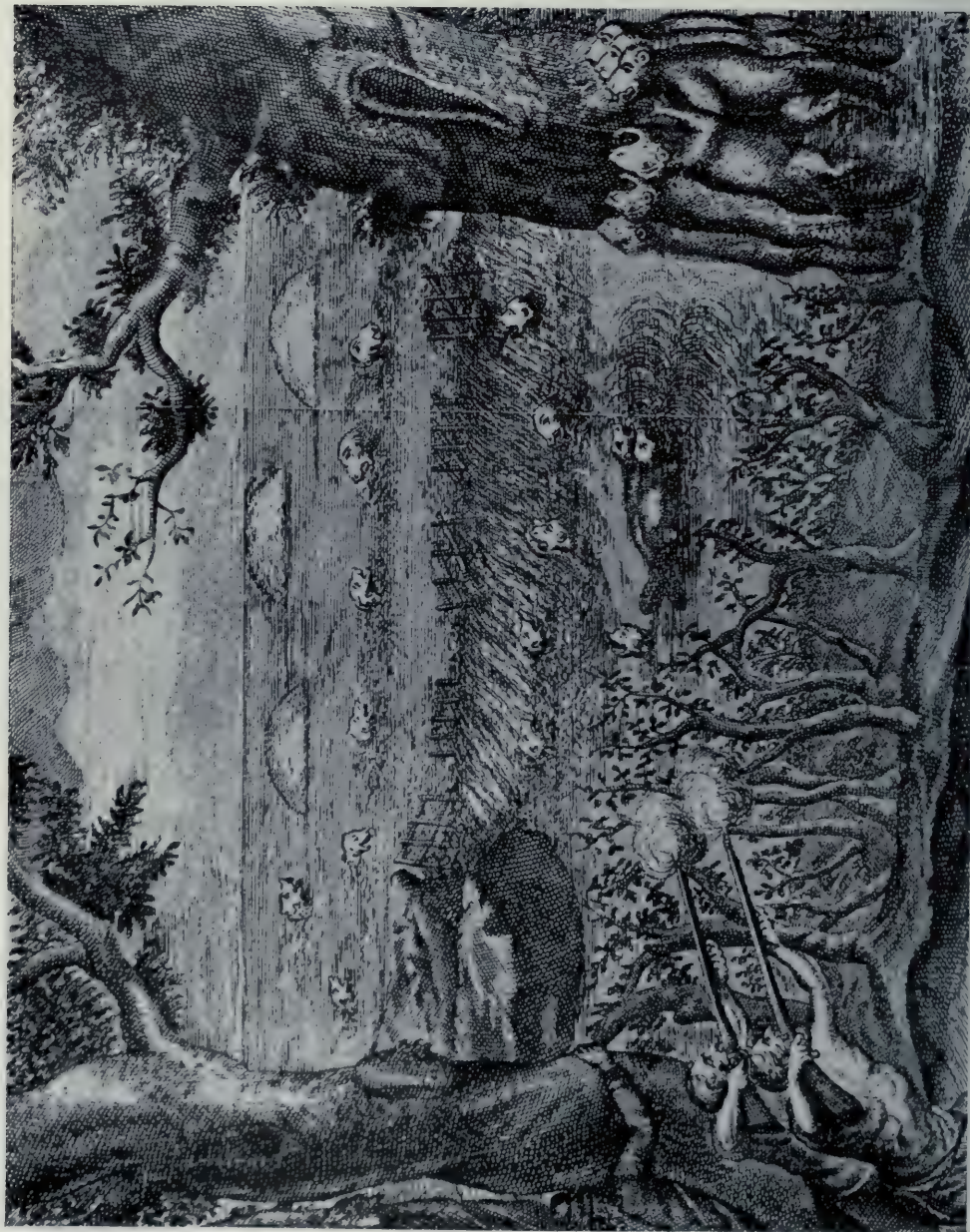
Photograph by Mr. Albert E. Butler

BEAVER PONDS IN ESTES PARK, COLORADO

Beavers have dammed the little stream running through the valley and not fewer than twenty ponds show from the point at which this view was taken

THE BEAVER ACCORDING
TO SEIGNEUR LE BEAU

From *Asantures du Sr. C.
le Beau*, 1738. The account
of Le Beau might well excite
the admiration and envy of
some of our more modern
writers. Note on the right
the company of beavers
standing on their hind legs
to cut down the tree



the natural increase of a beaver colony would yield a stated number of skins annually, the chief care necessary being to plant trees to provide a food supply. How readily this could be done is shown by the history of the beaver in the State of New York, where they once abounded and where in spite of persistent trapping they seem not to have been wholly exterminated, although in 1894 Mr. Radford finds that not more than ten were left in the Adirondack region.

In 1904 the State of New York appropriated five hundred dollars for the reintroduction of beaver and with this and subsequent appropriations and the aid of private contributions some thirty-four animals were turned loose. By 1908 there were about one hundred and fifty animals in the Adirondacks and since then they have not only increased but spread to other localities, a few even being found in northern New Jersey, although these may have been quietly introduced.

The beaver seems formerly to have been found throughout the greater part of North America, outside the tropics, or wherever food and natural conditions were favorable.

Many places, including several counties, have been named from the former occurrence of

beaver and there are no less than fifty post-offices in the United States and one hundred lakes and streams thus designated besides innumerable locally known beaver ponds and beaver dams. It is quite possible that Beaver Dam Pond near Manomet, Plymouth, may have



Photograph by Mr. C. H. Simpson
Beaver Dam, Maskinonge, Province of Quebec



Photograph by Mr. W. H. Balch
Beaver hut on the Maine border



STUMPS OF ASPENS FELLED BY BEAVERS

Some of the beaver's work with aspens (*Populus tremuloides*) on beaver pond in Estes Park, Colorado

furnished some of the beaver skins shipped on the "Fortune," but it has recently been converted into a cranberry bog and now not even a muskrat is to be found there.

In some places, notably in England, the beaver is commemorated by names that have long lost their significance, although in many instances they retain more of their original spelling than one might at first imagine. Such are, Beverege, Bevere Island, Beverecote and Beverly, the last not being named in honor of Sir John Beverly, but being an evolution of "Before leag" or "Beaver Place."

It is necessary to say only a few words about the habits and habitations of the beaver, as these are dwelt on at length in every work on natural history.¹ The beaver is shy and retiring in his habits, as well as nocturnal,

and this combination of characters, although conducive to longevity in a state of nature, is not a success in a zoölogical garden. In order to see the beaver at all he must be kept in a cage, where he not unnaturally sulks

and tries to show as little of himself as possible.

The structures built by the beaver vary somewhat with his surroundings and his house may either stand in moderately deep water, rest against the bank of a river, or as in the Museum group, be erected on the edge of a pond. While usually built of sticks from which the bark has been removed for food, it may, as in some northern streams where food and building material are abundant, be constructed of unpeeled sticks. In any case, the house chamber is above water and here the beavers pass the winter more or less inactively, and here

the young, numbering from two to five, are born in May.

Those who know the animal best look upon the canals constructed for the transportation of food supplies as the most



The earliest picture of the beaver, 1684

remarkable of all his undertakings. Man, with the aid of steam and electricity excavates the Suez and Panama Canals, but the beaver, a creature weighing on an average thirty or forty pounds, with no tools except teeth and paws, digs trenches 150 to 750 feet long and a yard wide and deep. Further than this, in cases where the ground slopes rapidly, the beaver will erect dam after dam, and dig canal after canal until by a succession of steplike levels, the needed food is obtained.

The dams also vary and may consist mainly of earth, or of sticks packed with earth. As in the dam shown

¹ For the benefit of those who wish to pursue the subject further, a list of the more important or more interesting books and papers is appended:

The American Beaver and His Works, by Lewis H. Morgan.

Castorologia: or, The History and Traditions of the Canadian Beaver, by Horace T. Martin, F. Z. S.

In Beaver World, by Enos A. Mills.

The Story of the Beaver, by William Davenport Hulbert.

Haunts of the Beaver, by A. R. Dugmore. Everybody's Magazine, December, 1901.

Beaver in the Adirondacks, by H. V. Radford.

in the group, grass and willows often take root and convert the dam into a wooded island. The dams, which serve to protect the houses by surrounding them with water, are chiefly for purposes of transportation and enable the animals to bring to their houses the branches whose bark serves as food. Mills styles the beaver "the original conservationist" and calls attention to the part he and his dams have played in agriculture by converting streams into marshes and subsequently into broad flat meadows. Here the palæontologist should join the farmer in a vote of thanks, for some of the best preserved skeletons of mastodons (like that in the Museum of the Brooklyn Institute of Arts and Sciences) have been

found imbedded in the mud of old-time beaver ponds.

The remarkable things that beavers actually do in nature are nothing to what they do in books, and just as children say the brightest things their parents can think of, so an animal's natural intelligence (or that which seems to be intelligence) loses nothing in the telling, and some marvelous tales have been told of the beaver. The account of Le Beau might well excite the admiration and envy of some of our more modern writers. The company of beavers uniting to fell the large tree is a brilliant flight of fancy wherein the writer has been ably seconded by the artist.

The most widespread fallacy, and the



Black ash cut by beavers near Port Kent, New York. Gift of W. H. Howell. The cuttings show characteristic marks of the beaver's teeth



Schaeffer's Farm, Newburg, where the Brooklyn mastodon was found. The site of an ancient beaver pond, now a fertile meadow

most natural, is that the beaver uses his tail as a trowel, and also in the transportation of various materials. He really ought to do these things for which the tail seems so well adapted, but he doesn't. He does however, give notice of impending danger by striking the ground or water, as the case may be; and the slap of a beaver's tail on the water will resound through the quiet night like the crack of a rifle.

So much for the beaver in general; a great deal more might be said about him, and has been said in a number of books, besides numberless papers, popular and otherwise.

As might be expected, any animal that covers almost the length and breadth of a continent is subject to variation in parts of its range, and although tendency to vary is in a measure checked by great similarity in habitat and habits, there is enough to divide the beaver into four or five geographic races or subspecies. That shown in our group

is the Sonoran beaver. The specimens with the permission of the Department of Game and Fish of Colorado, were taken by Mr. Albert E. Butler in the summer of 1913 and so do not show the animals at their best as regards coat, although it is necessary to show them at this time of year in order to include the young and have the surroundings. When capturing the beaver, Mr. Butler also took photographs and gathered the trees, house and foliage used in the group.

The background of the group, which incidentally portrays a dam and canal, is by Mr. Hobart Nichols, whose skilled brush has provided appropriate settings not only for many of the habitat groups of birds but also for the equally beautiful

groups of amphibians. The locality is a valley in Estes Park, Colorado, looking from the slope of Mount Meeker toward Lily Mountain. Here years ago, the busy beavers dammed the little stream converting the valley into a series of ponds and swamps.



The Arms of New Amsterdam



FOSSIL REPTILE FROM CAPE COLONY

Dicynodon platyrops Broom [one-fifth natural size] from New Bethesda, Cape Colony. The skull was found about ten yards away from the greater part of the skeleton and may not belong to the same individual but it is undoubtedly the skull of the same species and of an animal of similar size. The fragments of the fore limbs were also found some yards away and may not belong to the same individual but they too are of the same species. All the rest of the skeleton was found associated

THE BROOM FOSSIL REPTILE COLLECTION

By Henry Fairfield Osborn

THE land life of Permian times in South Africa brought to the Museum by Dr. Robert Broom and now acquired as a permanent possession of the Museum, has interest because of its vast antiquity and the relationship which certain parts of this life bear to the ancestry of the mammals, the group of vertebrates to which man belongs. These strange and archaic forms of amphibians and reptiles, which represent for the most part orders now extinct, will be placed beside those of our own American Permian from Texas and New Mexico, acquired in the Cope Collection many years ago through the gift of Morris K. Jesup.

The relationship between the American and African life has long been the subject of debate among palæontologists, so that the opportunity afforded by the acquisition of the Broom Collection to bring side by side these extraordinary animals from widely separated parts of the most ancient world is an event of real importance in palæontology. We shall now see the archaic and monstrous forms of amphibians and reptiles of Permian Africa arranged with those of Permian Texas, showing the striking series of resemblances and contrasts through which perhaps the question of relationship may be solved. Dr. Broom thinks he has detected some signs of affinity, but in general the forms outwardly seem very different.

These strange animals of the Permian continents first represent the climax of development of the amphibian kingdom, of which the puny modern representatives are the frogs, toads and sala-

manders. They are the first trials of nature in progression on land. The Texan reptiles continued to crawl close to the ground but in South Africa we find that in many of the groups through a powerful development of the limbs the body is raised well off the ground — a distinct advantage which gave the start that finally resulted in the evolution of the running mammals.

There are only three places in the world where Permian land life has left any records: South Africa, Texas and New Mexico, and the borders of the Dvina River in Russia. Strangely enough the Russian life in Permian times was closely related to that of South Africa in the common presence of many similar forms. It is true that here and there in South America and in Great Britain stragglers of the strange Permian world are found, but both South Africa and Texas present a wealth of forms.

The Broom Collection adds fifty to sixty types to the fifty-two types of Permian reptiles already in the American Museum. It is so rich in types that it rivals the British Museum collection, while from a spectacular point of view it surpasses that collection as well as the collection in the Cape Town Museum, for apart from its types it has an unusually large number of representative specimens and these in unusually perfect condition. It contains all the known specimens except one of the group of primitive mammal-like reptiles called the Dromosaurians; four skeletons of large Dinocerphalians, a group which is known in other great museums only by three skulls in the Cape Town Museum and by

two skulls and a number of bones in the British Museum; five skeletons of *Dicynodon*, the only other known skeletons being two in the British Museum; and one skeleton of *Endothiodon* with seven additional skulls, a genus represented in the Cape Town Museum by a very imperfect skeleton and a few fragments and about equally in the British Museum. It contains also some very fine specimens of Cynodont skulls and two perfect Therocephalian skulls besides many imperfect ones, the Cape Town Museum having but two as perfect and the British Museum only one of small size.

Certain of the South African skeletons of the collection have been mounted

under the direction of Dr. Broom, who has spent several months in the American Museum of Natural History preparing this collection for exhibition. Some are of massive size and gigantic proportions, others are diminutive, and in view of the fact that all were destined to extinction, we are reminded of the famous lines of Lucretius:

"Hence, doubtless, earth prodigious forms
at first
Gendered, of face and members most grotesque;
.....many a tribe has sunk suppress
Powerless its kind to gender. For whate'er
Feeds on the living ether, craft or speed,
Or courage stern, from age to age preserves
In ranks uninjured..."



An almost perfect skull of a large Pareiasaurus, *Pareiasaurus whaitsi* Broom, which lived some 17,000,000 years ago. The lower jaws are larger than in most species and have underneath two peculiar projections, the posterior of which resembles a small horn which passes inward. Both horns are broken off from the jaw on the left side. [One-fourth natural size]

FURTHER OBSERVATIONS ON THE SOUTH AFRICAN FOSSIL REPTILES

By Robert Broom

MANY of the specimens in the Broom Collection of South African fossil reptiles are of special importance to the student investigating the deep problems of evolution and comparative anatomy, but others are of the greatest interest to the general public as they throw much light on the past life of the world and on the struggles of the animals for existence in these remote ages. The animal life of the Karroo formation will be better understood by considering the principal types living at three different periods.

The first fauna which we consider may be called the *Pareiasaurus* fauna and it lived about seventeen million years ago. The huge *Pareiasaurus* was a heavily-built slow-moving animal rather larger than a half-grown hippopotamus and probably as sluggish in its movements as the large tortoises of the Galapagos Islands. Certainly it was a plant-eating animal and being comparatively helpless against its carnivorous enemies it probably protected itself by digging into the sandy and muddy banks after the manner of the Australian porcupine ant-eater. This we infer

from the fact that it had powerful digging claws on the front toes and that the back was protected by a number of bony plates.

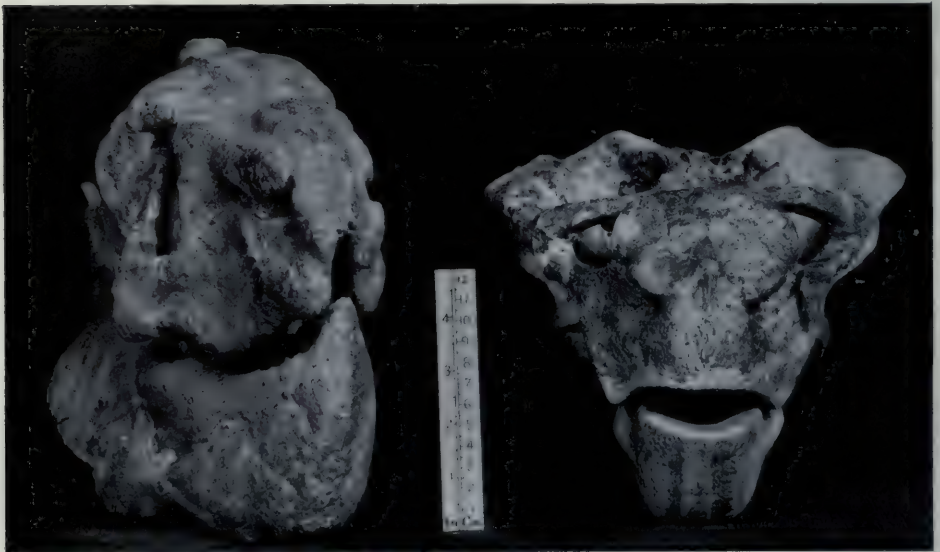
Along with *Pareiasaurus* there was another group of plant-eating animals, some of them even larger than *Pareia-*



Shoulder girdles and front limbs of a very large Dinocephalian, *Tapinocephalus atherstonei* Owen, from South Africa, now in the possession of the American Museum

saurus. These form the group of the Dinocephalians and of these there are a number of nearly complete skeletons in the Broom Collection — the only dinocephalian skeletons at present known. *Moschops* is a heavily-built form with powerful walking limbs and relatively small head. Another much larger form called *Tapinocephalus* is represented by the fore limbs and the shoulder girdles. It might be supposed that *Tapinocephalus* and *Pareiasaurus* were much too large to have been troubled with enemies

In the shales at Beaufort West we have representatives of the fauna that probably lived a quarter of a million years later than *Pareiasaurus*. The large herbivores we now meet with are the Endothiodons [illustrated in the December, 1913, JOURNAL], and with them are abundant representatives of the small Dicynodons. Like *Pareiasaurus* these later forms are heavily-built slow-moving forms which possibly for protection also dug their way into the muddy banks. They fed on the vegetation that flour-



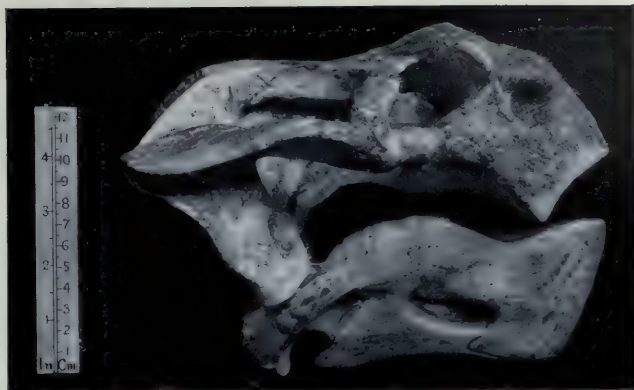
Front view of the skulls, *Endothiodon uniseries* Owen and *Dicynodon moschops* Broom, to show the difference in the mode of closing of the beaks

but we have reason to believe that like most later herbivorous forms there were carnivores that preyed upon them. They are at present however very imperfectly known. One called *Titano-suchus* is known by part of the jaws and was certainly large enough to have killed and devoured even the mighty *Pareiasaurus* and *Tapinocephalus*. With these giant forms there are a number of small carnivores, and the beginnings of the tortoise-beaked mammal-like reptiles which are better known in the later beds.

ished at the sides of the rivers and on the inundated plains. *Dicynodon* resembled *Endothiodon* in many ways but differed in having in the male a pair of tusks. The small Dicynodons must have been very abundant as in many places numerous skulls can be picked up but curiously enough complete skeletons are rare. Often two or three skulls are found together in the shale without any other bones of the skeleton being near and isolated limb bones and vertebræ may be picked up in the deposit. The reason

for this, is probably that the dead animals were devoured by small carnivores and the bones scattered about by them. In Australia we find the same thing happening to-day. The carcass of any sheep is almost certain to have its bones scattered by the native cats which often drag portions of the animal for long distances to their dens.

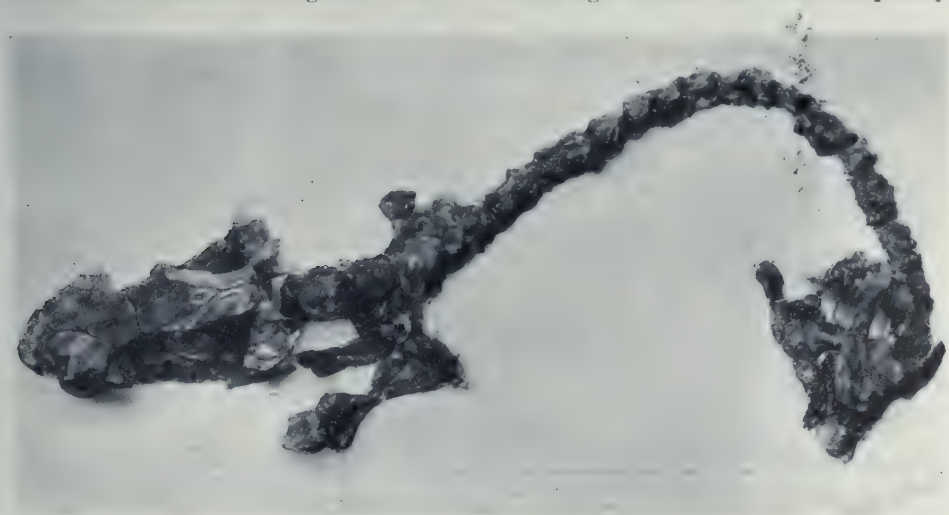
The carnivorous reptiles that fed on the large Endothiodons were almost certainly large wolflike reptiles called *Scymnognathus* [See figure of skull in December JOURNAL]. The enemies of the smaller Dicynodons were carnivorous reptiles called *Elurosaurus* belonging to the same group as *Scymnognathus*. In the collection besides specimens of the large Endothiodons and the large carnivorous reptiles, there are a number of small dicynodon skeletons from the Beaufort West region. The two in the illustrations together with a



Perfect skull of a broad-headed Dicynodon, *Dicynodon moschops* Broom, with the lower jaw restored. This is a female as is shown by the lack of a tusk

third not figured show very well the proportions of this remarkable reptilian type and are the first skeletons of *Dicynodon* that have ever been mounted.

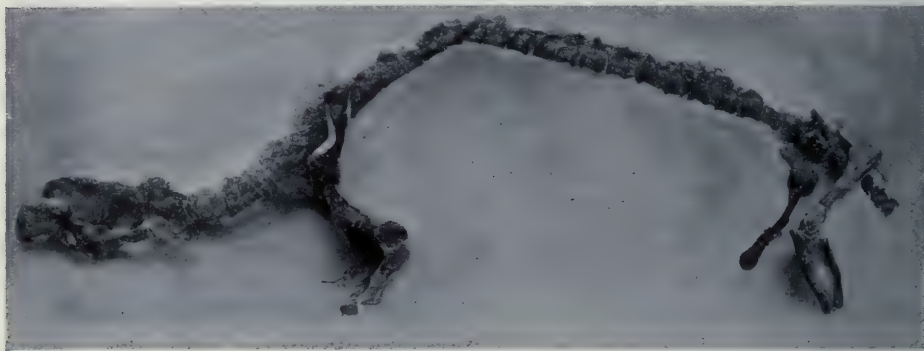
At New Bethesda in Cape Colony we have representatives of a fauna that lived still another quarter or half million years later. The large Endothiodons are now extinct, and their place is taken by moderately large Dicynodons. A few small Pareiasaurians still survive which differ from the earlier larger types in having the back and sides completely



Nearly complete skeleton of a small species of Dicynodon, *Dicynodon psittacops* Broom, from Beaufort West. The bones of the limbs and girdles are as found [About one-third natural size]

covered by bony plates. The carnivores are for the most part very similar to those in earlier beds and here again we may feel certain that they killed the *Dicynodons* and scattered their bones. Of the skeleton of one of the larger Dicy-

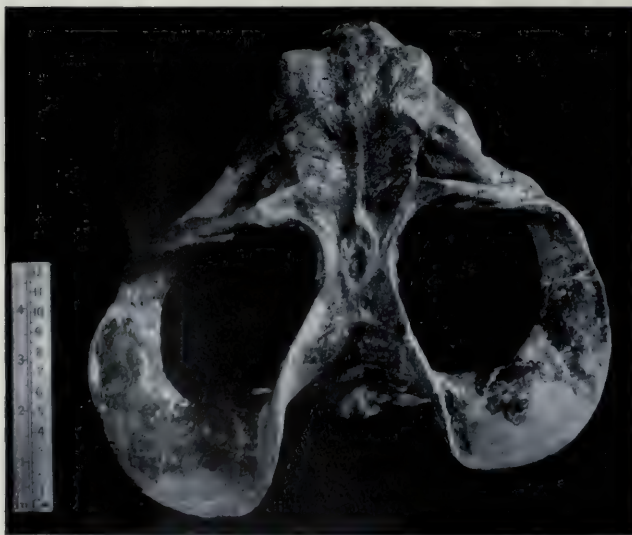
the front limb bones were also some yards away, as if the carnivore which killed the *Dicynodon* had dragged the head some distance away and after having devoured all it wished of this part had returned to the carcass and dragged off the fore



Dicynodon planus, from Beaufort West. Nearly perfect skeleton which probably belongs to this species but as the skull is rather imperfect there is some slight doubt of the determination. The skull is much crushed and imperfect. The limbs and girdles are restored in as nearly the walking position as is practicable [$\frac{5}{12}$ natural size]

nodons shown in the illustration, the skull was found about ten yards from the posterior part of the skeleton, and

limbs. Contemporaneous with these *Dicynodons* and carnivores are a number of small lizard-like animals of which there are representatives in the collection.



Dicynodon laticeps. Top of the skull of a broad-headed form of *Dicynodon*. This specimen is a male and had had a pair of large tusks which unfortunately were broken off

The next fauna which is well known is possibly a million years later than that seen at New Bethesda and may be called the Burghersdorp fauna. It is characterized by the presence of *Dicynodons* even much larger than those of New Bethesda or the *Endothiodons* of Beaufort West. The carnivores belong to the group of extremely mammal-like forms called *Cynodonts*, of which there are some specimens in the col-

lection [See illustrations in December JOURNAL].

The study of these various faunas of South Africa shows the progressive evolution from the very early mammal-like

reptiles that preyed on the huge, slow-moving *Pareiasaurus* to the Cynodonts of later beds, carnivorous animals which are so like mammals that it is only with difficulty that they can be distinguished.



A complete skull of the *Dicynodon leontops*, about one-third natural size. This is the only known large *Dicynodon* in which the tusks are perfectly preserved. Although in the specimen they are somewhat crushed together, there is no doubt that the lower jaw passed up between the tusks. The inner sides have been ground down by the rubbing of the lower jaw against them. Both tusks are blunt and would probably be of little service as weapons of offense

RESOLUTIONS TO PROFESSOR BICKMORE ON THE OCCASION OF HIS SEVENTY-FIFTH BIRTHDAY

AT the forty-fifth annual meeting of the Board of Trustees of the American Museum of Natural History on February 2, 1914, the Trustees requested the President and Secretary to transmit to their colleague, Professor Albert S. Bickmore, the following greeting on his seventy-fifth birthday:

The Trustees of the American Museum of Natural History extend to their colleague, Professor Albert S. Bickmore, their most cordial greetings and heartiest congratulations on his seventy-fifth birthday.

There is a deeper significance in this action of the Trustees than the conveyance of formal greetings would imply, for they are mindful of the debt of gratitude they in common with all other citizens of New York owe to Professor Bickmore for his services in initiating the great plan of the American Museum of Natural History. His enthusiasm and persistent optimism were the principal factors in arousing the interest of that splendid group of men who actually created the American Museum of Natural History.

To Professor Bickmore also belongs the credit of conceiving the ideal plan of the relations between the Museum and the municipality, which was adopted in the beginning and has worked so admirably that no material change has been necessary.

His fostering care in the early days of the Museum and his influence in shaping its policy, combined with his clear perception of the scope of a Museum of Natural History, were of inestimable value in developing an institution of international reputation. His devotion to the Museum has been manifested in many ways and by countless services from 1869 to the present time. His enduring monument will be the creation of the Department of Public Education in 1880.

The Trustees recall with pleasure their long personal association with Professor Bickmore

and desire to express their great esteem and high regard for him.

(Signed) CLEVELAND H. DODGE
Acting President

(Signed) ADRIAN ISELIN, Jr.
Secretary

At a meeting held on February 10, 1914, the Faculty of the American Museum of Natural History unanimously adopted the following message of congratulation to Professor Albert S. Bickmore upon the attainment of his seventy-fifth birthday:

Your associates on the scientific staff of the American Museum of Natural History extend to you their heartiest congratulations on the completion of seventy-five years of a life, the major portion of which has been devoted to active and valued service to your fellow men.

Born of sturdy New England stock, educated in part under the immortal Louis Agassiz, fortunate in possessing far-sighted prescience and boundless enthusiasm, you conceived the idea of a great general museum of natural history to be located in the metropolis of the western world, impressed it upon the influential and public-spirited men of New York City, secured its satisfactory incorporation, and you have lived to see the fruition of your plans beyond your fondest original hopes. The child of your dreams has become a mighty adult in your later years, and the American Museum of Natural History has grown into an institution which confers honor upon the scientists who have the privilege of being connected with it.

We, your colleagues, wish you peace and prosperity and the enjoyment of many additional years in our midst.

(Signed) FREDERIC A. LUCAS
Director

(Signed) EDMUND OTIS HOVEY
Secretary

THEODORE ROOSEVELT, PATRON OF THE AMERICAN MUSEUM'S FIELD WORK IN SOUTH AMERICA

IT is with the greatest pleasure that the JOURNAL publishes the following letter from Theodore Roosevelt to Henry Fairfield Osborn, president of the American Museum of Natural History. The letter written at San Luiz de Caceres came sometime ago and has appeared in part in the New York daily papers, but it is a document of particular value to all connected with the American Museum as testifying to the broad-minded generosity of Colonel Roosevelt toward the institution and toward scientists, and as exemplifying his personal interest in scientific work. The Museum is awaiting the return of Colonel Roosevelt in May when an expedition to carry on the Museum's exploration of South America will be considered. The Duida region is geologically one of the oldest and least known on the South American continent and collections from there are certain to have great scientific value.

Colonel Roosevelt gives all credit for results of the present South American expedition, which he is financing, to the men working with him; he insists that the men who have done the work in the field are decidedly the men to study and describe the material of the expedition in any book which may be forthcoming and he gives from his personal funds for the continuation of South American field work by his companions.

The letter which follows is quoted almost in full:

The trip has begun, I think I may say, fairly well, at least from the standpoint of the American Museum. Cherrie and Miller have now collected well over a thousand specimens of birds and mammals, and Kermit and I have been able to contribute specimens of some of the larger species, such as the jaguar,

the giant ant-bear, the peccory, swamp deer, etc. I have already written Chapman as to my very earnest desire that Cherrie and Miller be permitted to publish under the auspices of the Museum a volume on the mammalogy and ornithology of Matto Grosso and Amazonas. I have the very strongest feeling that the most valuable work can always be done by men who are both trained scientific men and also field naturalists who with scientific knowledge write of what they have themselves seen in the field. I particularly wish to avoid seeing grow up in the United States the type of scientist who merely supplies the nomenclature and technical descriptions for specimens furnished him by field observers. As you know, I obtained permission from the Smithsonian people for Heller to do this work for the mammals of our African expedition. He has done much better work on such rare and little known species as the white rhinoceros, giant eland and Nile lechwe than could have been done by any man who did not combine both the technical knowledge and the field experience. Besides, it seems to me a matter of justice that the men who undergo the hardship and discomfort of work in the field should be permitted themselves to describe the animals they have collected, and to give their life histories. The man at home cannot adequately give the life histories. For instance, when Cherrie collected for the Rothschild Museum, he sent home the life histories, which were entirely distinctive individually, of three species of vulture. But the men at home, looking at the prepared specimens, saw no differences, and published an abbreviated account of his notes, gave no notes of the life histories at all, simply giving one name to three birds of entirely distinct habits, and, when freshly killed, entirely distinct aspect.

As regards myself, I am only too delighted to have the chance of having such men as Cherrie and Miller with me, and I am proud of being connected with the Museum. What I do in paying the expenses of the two men is much more than repaid by the pleasure I get in having them with me and in helping to do the work. But if you and the authorities of the Museum feel that you would like

in any way to recognize the fact that I have taken them with me, and am giving the collections to the Museum, then there is no other recognition that I would value in any way so much as the granting of the permission to Cherrie and Miller to write this book themselves. They will put in careful notes on the life histories of the mammals and birds. They have many such notes now. They already have most of the technical knowledge, and they can gain what they lack by six months study at home. The only objection that I can see will be that some little time will elapse, some months, possibly a year, before the volume could be put out. But they could submit (and I also, if you desire it) a preliminary report, very brief, for publication in the *Bulletin* of the Museum, which would give you immediately the results of the expedition. Then if this volume were published, it would remain as a permanent contribution to scientific knowledge made under the auspices of the Museum, and of value similar to the work done by Agassiz and his companions in the trip to the Amazon fifty years ago. No other two field mammalogists and ornithologists have had the opportunity that this trip will give to Cherrie and Miller, and I want to see their work preserved in a volume and not in a collection of pamphlets. Pamphlets, even scientific pamphlets, are almost as ephemeral as newspapers. For example, Allen lent us his copy of Slater and Hudson's volume on Argentine ornithology to take down with us. It has been of the utmost value to us, to all of us and to me personally, whereas none of us know of the very existence of the multitude of little pamphlets on Argentine ornithology that were published about the time this work was published. Really the only use that pamphlets serve are as bricks out of which some permanent structure can be made by a writer who will devote himself to serious work on the subject, and one good big work is worth at least a hundred good small works on portions of the same subjects.

So far we have been favored by the weather, but it looks now as if the rainy season had begun, and we shall probably have a good deal of discomfort during the next four

months. Probably we shall not collect as many specimens during these next four months as we have already collected in the last six weeks. All the specimens that have not been shipped from Corumbá will be shipped from San Luiz de Caçeres, from which point on, our facilities for transportation will be greatly diminished. Cherrie and Miller have already had some rough experiences with mosquitoes and other insects on their collecting tours, but where I have been so far there has been no hardship whatever. I shall make up for it however later on, especially if we are able to do as I hope and go down the unknown river of which Colonel Rondon has come across the head. In that case one of the naturalists, probably Cherrie, will go down the river with me, and Miller will go down by the Gy Paraná and Madeira, so that the collections will be covering two territories.

When I get back I am anxious to help you send Miller to complete his work around Mount Duida, to ascend the mountain to the top, and thoroughly to work the neighborhood from the standpoint of the mammalogist and ornithologist. He ought to have about five thousand dollars for the trip. I will subscribe one thousand and do my best to help raise the remainder. . . . Miller has begun this work around Mount Duida, and if he is given the time and the moderate amount of money necessary, he can thoroughly finish the work and do something emphatically creditable to the Museum. As I shall probably take Cherrie down the river de Duvida, I wish to give this as a kind of consolation prize to Miller! I shall also help, with a thousand dollars in sending Cherrie back, for the Museum to work thoroughly these upper Paraguay marshes. They offer a wonderful field.

I very earnestly hope that Chapman has been favorably struck by my proposal, that you will be favorably struck by it, and that my request will be granted. . . .

Faithfully yours,

(Signed) THEODORE ROOSEVELT

President Henry Fairfield Osborn,
American Museum of Natural History,
New York City.

BANDELIER—PIONEER STUDENT OF ANCIENT AMERICAN RACES

By Clark Wissler

ADOLPH FRANCIS ALPHONSE BANDELIER died in Madrid, Spain, on March 18, 1914. He was born at Berne, Switzerland, in 1840 and came to America while a youth. In early life he resided in Highland, Illinois, where he was married to Josephine Huegy in 1862. He was always a student and during the formative period of his life came under the influence of Lewis H. Morgan, one of the world's most noted social philosophers. In conversation, Dr. Bandelier always referred to Morgan as "my revered teacher." That the influence of Morgan was fundamental is clear from Bandelier's writings, for he never approaches the social problems of ethnology from any other than the Morgan point of view. This is especially true of his first important work, an epoch-making study of the Aztecs, published in 1877-8.

Dr. Bandelier's first important work in archæology began with his commission by the Archæological Institute of America to survey and report upon the pueblo ruins of New Mexico. This work occupied his whole time from 1880-1889. He traversed, chiefly on foot, the entire Rio Grande Valley, examined and surveyed all the known village sites, made a careful study of the historical traditions of the living Indians and made masterly use of the Spanish archives. By correlating the accounts of the surviving Indians and the records of the early Spanish explorers with his own objective study of the ruins, he was able to separate the historic from the prehistoric ruins. His reports extend through several volumes and constitute the great

classic of American archæological research.

In 1892, Dr. Bandelier began collecting and investigating the archæology of Peru under the direction of the late Henry Villard. In 1894, Mr. Villard presented the collection to this Museum. The Museum then took up the work and supported it continuously until 1901. During this time Dr. Bandelier was working systematically and steadily in Peru. With the approval of Professor F. W. Putnam, then curator of anthropology, he set out to do in Peru what he had done in Arizona and New Mexico: i. e., to make an exhaustive investigation of the Peruvians by correlating historical, ethnological and archæological researches.

In 1903 he came to New York to work up his data and was officially connected with the American Museum until 1906, when he resigned to take up some research work in the Hispanic Museum. Shortly after, illness overtook him and left him permanently disabled. In consequence the results of his Peruvian work remain unformulated, the task he had undertaken being too exacting for his declining years. Thus, unfortunately, his most distinctive work will be the archæology of the Rio Grande Valley and the ethnology of the Aztecs.

The selection of Dr. Bandelier by the directors of the Archæological Institute to carry out their plans in the Southwest was chiefly due to the strong indorsement given him by Lewis H. Morgan. In the report of the Archæological Institute for 1881 announcing his appoint-

ment, will be found the following estimate of his fitness:

....Mr. Bandelier has for many years occupied himself with the study of the history and institutions of the native races of Mexico and the adjoining region, at the time of, and before the Spanish Conquest and settlement of the country. The remarkable extent and solidity of his learning in this field, his sound judgment, and his acute intelligence in the interpretation of historical evidence, have been shown in his able and important essays, "On the Art of War and Mode of Warfare of the Ancient Mexicans"; "On the Distribution and Tenure of Lands, and the Customs with respect to Inheritance, among the Ancient Mexicans"; and "On the Social Organization and Mode of Government of the Ancient Mexicans."

Thus qualified by erudition, Dr. Bandelier is no less qualified by character for the task of investigating the life and traditions of the descendants of the people whom the Spaniards found inhabiting the countries which they conquered and occupied. His energy and zeal, his capacity of adapting himself to circumstances, his readiness to endure the hardships incident to the performance of his task, his unusual linguistic attainments, his trained faculty of observation, form a combination of qualities such as warrant the value of the work he may perform in the exploration of the ancient remains, and the observation of the actual life of the Indians of the Pueblos of the Southwest.

That he did get deep into Indian life is clear from extracts from his letters to Charles Eliot Norton, then President in the Archæological Institute. In a letter headed Cochiti, November 27, 1880, he wrote:

My relations with the Indians of this pueblo are very friendly. Sharing their

food, their hardships, and their pleasures, simple as they are, a mutual attachment has formed itself, which grows into sincere affection. They begin to treat me as one of their own, and to exhibit toward me that spirit of fraternity which prevails among them in their communism. Of course they have squabbles among themselves, which often reveal to me some new features of their organization; but on the whole they are the best people the sun shines upon. How long will they last? They progress slowly, but still they are progressing. God preserve them from any attempt at rapid "Americanization." It would be their death-blow.

At night, if they do not come to see me, to sit around very modestly without interruption of my work, I sometimes go to call on some of my nearest friends among them, especially the Lieutenant of the "Capitan della Guerra," Victoriano, a young man with a small family. Squatting on one of their low stools, hewn out of one block, or stretched out side by side on serapes, we chat and smoke — water, out of the common tinaja, being the only refreshment offered and expected. His wife and his sister go about, mingling freely in the conversation — for both sexes are on a footing of great equality. We talk Spanish, and sometimes a word in Queres. The girls tease me about my defective pronunciation.

In another letter he says:

The Indians talk freely with me. Juan Jose has begun to dictate to me in Queres the history of Montezuma. I maintain my original position — namely, that it is a stem of Catholic ideas, and of the history of the Conquest, and have even the proof of it. The document will be at least linguistically interesting. With the assistance of an Indian friend, who has been at the school of the Christian Brethren at Santa Fé, I am beginning to assort my linguistic material grammatically.



The dooryard of the president of the Meriden Bird Club. More than one hundred redpolls and pine siskins feeding on hemp seed which has been scattered over the surface of the snow

WHAT ONE VILLAGE IS DOING FOR THE BIRDS¹

By Ernest Harold Baynes

I HAVE always had the firm conviction that if people could learn to know the birds better and study the best means of attracting and protecting them, the education of the people would in itself make legislation less needed, give better laws, and laws that would be kept. It was with this idea in mind that I began three years ago to interest the people in the little village of Meriden, New Hampshire, in becoming better acquainted with the birds. In order to do this, I gave in the chapel of

the Kimball Union Academy an illustrated lecture which laid stress upon the economic value of birds, and in which I urged the people of Meriden, and especially the students of the Academy, to start a movement looking to the organization of a bird club. The matter was immediately taken up and with the assistance of the Academy a bird club was formed with a membership of sixty, for "the increase and protection of our local wild birds, the stimulation of interest in bird life and the gradual establishment of a model bird sanctuary."

Starting with the idea that birds are very much like human beings in that

¹An address delivered before the American Ornithologists' Union at its last session, at the American Museum of Natural History, New York City.

their material wants are much the same — something to eat and drink and a shelter and place in which to rear their young — it became our purpose to provide them with these things so far as we could.

The first thing that we did was to raise a fund for the purchase of bird houses. There are scarcely a hundred and fifty people in our little village of Meriden, exclusive of the Academy, and few of the people are well to do. With a little outside help however, we were able to raise two hundred dollars, for almost everybody contributed something, the contributions ranging from fifteen cents to two dollars — few gave over that.

The food house that we adopted is an adaptation of the type invented by

Baron Hans von Berlepsch and seems to be so admirably fitted for the purpose for which it is intended that we have given it the official title of "Audubon" food house. The Audubon food house has a hopper roof of wood, an upper food tray, inclosed by four glass sides, and a lower food tray which is open and serves as an advertisement for the upper, the whole being supported by a pole which runs to the roof. After the birds have eaten the contents of the lower tray, the more adventurous ones lead the way to the upper, in which is kept a permanent supply of food, protected from the winds and storms by the glass sides about it and the roof above. These bird houses are a source of delight to the people as well as to the birds, for through the glass

sides the birds may be seen hopping about and, taking the greatest satisfaction in the repast that is provided for them.

Almost immediately after the formation of our bird club came the first snow and as food that is thrown out to the birds in winter readily sinks into the snow, the boys of the Academy attempted to provide a feeding-ground for them. At first they used shovels to clear away a space but soon discovered that a better method consisted in trampling down the snow. After the boys had done this, the girls came out to scatter seed — and this practice still continues.

Another method of



The "Audubon" food house used at Meriden. The lower food tray is open and serves as an advertisement for the upper tray under the roof

feeding that the boys adopted consisted in tying suet to the trees. They secured a large quantity of suet from the local butcher and fastened portions of it with several pieces of string so that birds could not take it away all at once, and high enough from the ground to be out of the reach of the dogs. Suet is a most valuable substitute for insect food and one which many birds appreciate.

Another and rather unique idea of a "food tree" seems also to "take" very well with the birds. Into large pots we put things that birds particularly like — suet, hemp seed, bread crumbs and other kinds of small food — and when this is boiling hot a number of the towns people pour it on the branches of discarded Christmas trees and scrubby spruces and hemlocks that have been cut down and planted in the garden. From this cafeteria each bird takes what he likes best.

The weathercock food house, the design for which was kindly sent to me by Mr. William Dutcher, has been successfully used also. As the name implies, this food house moves with the wind and the entrance is always away from the storm. The movement

of the house does not seem to disturb the birds in the least.

Another contrivance that we have for birds in winter is the window box. Ours is a plain glass case with a wooden frame which has at the top a groove into which



Blue jays feeding in a weathercock food house. Birds are like human beings in that their material wants are the same, something to eat and drink and a sheltered home in which to raise their young. The movement of the weathercock house does not disturb the birds



MR. BAYNES AND SOME OF HIS FRIENDS IN AN OPEN SPACE IN THE BIRD
SANCTUARY AT MERIDEN, NEW HAMPSHIRE

the window fits snugly and a door through which to put the food. The box is of course entirely open on the garden side and projects into the room for about a foot. The birds seem to enjoy it thoroughly and it adds such a cheery tone to the room that many who have seen it have become enthusiastic and have made similar boxes. Into this window box come woodpeckers, blue jays, juncos, chickadees and other birds; they are practically in the room with us with only a sheet of glass between and we are able to observe them and to photograph them at our leisure.

The birds have become so well acquainted with the people in Meriden and their friendly attitude toward them that it seems as though there is no limit to their tameness and especially is this true of the chickadees. They alight upon our clothing when we go out, they perch upon the barrels of our guns when we walk abroad in pursuit of their enemies, and they even come to take breakfast with us. At first when they would fly into the dining-room, they would seize the nuts scattered on the table for them and then be off, but in order to urge them to stay longer with us and to show them how welcome they were, we stitched the nuts to the tablecloth — and they stayed.

Another thing that we have attempted to do for the birds is to provide them with

houses and nest boxes so attractive that they would stay with us to make their nests and rear their young. The martins had not been seen in Meriden in twenty-five years and one of our aims was to attract them. We made houses from flour barrels and the martins did come back and although they did not actually nest with us they went so far as to tear out the nests of the tree swallows, and I think that next year they will decide to build. The humming birds would come

with the lilacs and leave when they had faded, but with the use of bright artificial flowers in which were hidden vials of honey and water we persuaded them to stay with us throughout the summer. An old shed of ours had been a favorite nesting place for the phœbes and when it became necessary for us to part with the shed it seemed as though we might lose the birds too, but shelves that I tacked up inside the veranda have served their purpose well and the phœbes continue to visit us. For the



A lady's hat where birds are safe

birds which naturally nest in holes in trees, we imported nests that are exact facsimiles of their own but we had so much trouble about importing them that we now make them ourselves.

Bird baths have formed another interesting feature of our work and last summer we observed eighteen different kinds of birds bathing at one of the baths. We placed flat stones in some of the baths so that the birds can go into the



White-winged crossbills feeding in the snow. As food that is thrown out to the birds in winter readily sinks into the snow and is thus lost to the birds, at Meriden the plan is followed of trampling down the snow to form a feeding-ground on which the seed is scattered. This method has been found to be more practicable than shoveling away the snow.



A picturesque bird bath in Meriden, New Hampshire. As many as eighteen different kinds of birds have been observed bathing at such a bird bath

water by degrees; in others the bottoms sloped gradually so as to vary the depth. Land birds dislike to step immediately into deep water. A light lunch for them is placed near by and it is an amusing sight to watch them bathe, eat and bathe again.

One of the objects of the club was the establishment of a bird sanctuary and this has been made possible by a gift of a thousand dollars from Miss Helen Woodruff Smith. With this money we bought a thirty-acre farm which has been laid out by Mr. Frederic H. Kennard, the landscape architect, and which we are gradually developing into



Mrs. Baynes with a chickadee friend

a bird sanctuary. The farmhouse we shall convert into a museum to which people may come to see the best methods of attracting the birds.



A chickadee at the entrance of a Berlepsch bird box

When last autumn it was decided to dedicate the sanctuary, Mr. Percy Mackaye wrote for the occasion a bird masque. Two of President Wilson's daughters, Miss Eleanor and Miss Margaret Wilson took part, and the masque was produced in the little village of Meriden, eight miles from the nearest railroad, before six hundred of the most distinguished people in New England at that time, including President and Mrs. Wilson. The masque was a success and in the repertory of the Coburn Players continues to play its part in the campaign for wild bird conservation. But after all, this work is only a beginning. It is a beginning however of which we are proud, for similar clubs are springing up all around us — in Hanover, Cornish, Claremont, Charlestown, Walpole and Franklin in New Hampshire; Brookline, Milton, Springfield, Southboro, Groton, and Pittsfield in

Massachusetts; Montpelier in Vermont; Glens Falls in New York, and many other places — all as a direct result of the work done in our little village of a hundred and fifty people. And in every town and village where there has been a bird club the results have been good. Not only have the birds been benefited but the girls and boys as well, for they have been taught kindness, thoughtfulness and generosity and children who learn these things make pretty good citizens whether they are taught anything else or not.

My experience so far has led me to be fully convinced that if a network of these clubs can be stretched across the country, such an interest and love for the birds will be created that, as I said in opening, there will be little need for legislation and what legislation is needed will readily be secured.



Young catbirds discussing the pure food question

THE CHARLES S. MASON COLLECTION

By Alanson Skinner

DURING recent years few accessions in archæology have rivaled in interest the Mason collection from Tennessee, donated to the Museum in the summer of 1913 by Mr. J. P. Morgan. The material is the fruit of many years of painstaking work by Mr. Charles S. Mason and is of added value to students in that it was gathered within one general locality, the vicinity of Jonesboro, Tennessee. Many of the specimens come from an old aboriginal cemetery on the Nolachucky River, and may be examples of Cherokee handicraft.

The collection contains two of the rare engraved shell gorgets so typical of the archæology of southeastern United States. They are made of the shell of one of the large conchs found both in the Gulf of Mexico and along the southern coast and traded inland. Examples of a similar sort have been discovered in the mound area of the Ohio Valley. With the gorgets are included a number of massive shell beads, such as are found especially with skeletons exhumed from the stone-lined graves of Tennessee, and several interesting pins of shell are also notable. There

are also in the collection a number of perforated bear's teeth and a trade copper gorget.

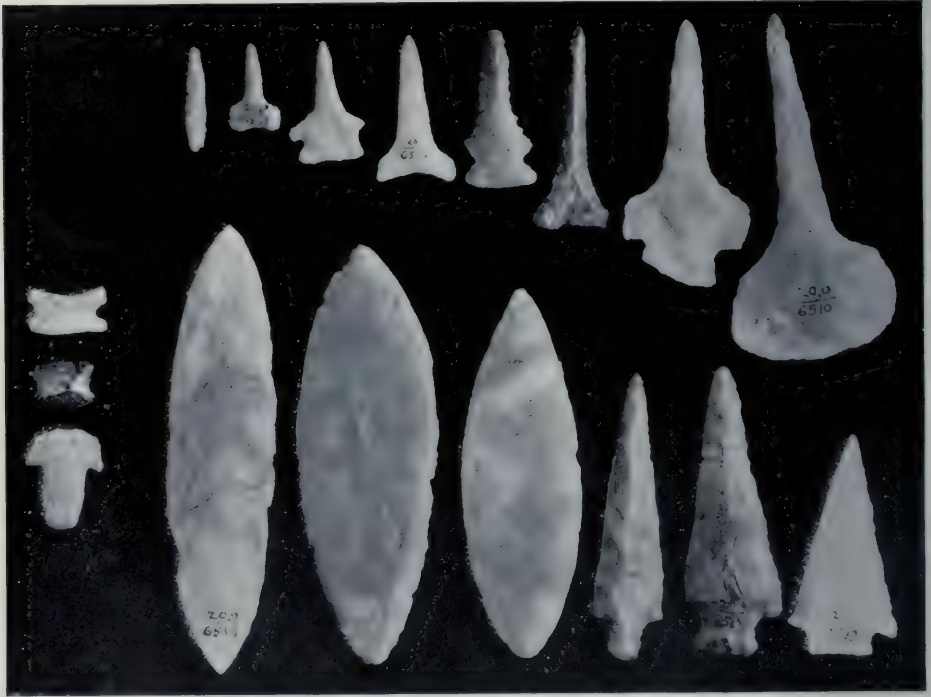
A remarkable series of steatite pendants of all imaginable forms was brought together by Mr. Mason. These include a number of miniature grooved axes, some seemingly suspended by a thong tied about the groove, others perforated



Arrow points flaked into a great variety of forms, several with serrated edge

for the reception of the string. There is also a small set of banner stones — problematic forms which archaeologists for want of better data are given to class as ceremonials. Several boat-shaped ornaments, one or two of which hint at a use as pottery-polishers are included. A number of highly polished hematite cones may have served a like purpose. Quite unusual is a broken “bird-shaped

pipes of stone, both in natural and geometric forms, the Mason collection excels and fills a gap in our series — for we formerly had but a single specimen. Some of the stone pipes, particularly the plain rectangular type, run the whole gamut from a specimen weighing several pounds and of gigantic size to one scarcely an inch high. Some in coarse pottery are good examples of the angu-



The lower row illustrates the drill points used in drilling the holes in the objects shown in the illustrations on pages 159 and 162. In the upper row are examples of arrow and spear points or knives

amulet” with bulging eyes, a type far more frequently found farther north.

The Museum’s old collection from Tennessee was better off than the new collection as regards the colossal stone effigy pipes found there. These pipes, usually made of steatite are massive and consist generally of well-executed carvings of birds and mammals. There are several in the new collection however, and in small and delicately worked

lar, trumpet-shaped and straight tubular pipes. The clay pipes of the Southeast are all cruder in quality and workmanship than those farther north, in the country of the Iroquois for instance.

The Mason collection contains some huge flint knife and “spear” blades, and an unusual number of arrow points, drills and scrapers. A selected series of bizarre forms in arrowhead chippings shows extraordinary flights of native



On the left are flaked spear points. The two largest grooved axes at the right are especially typical of Tennessee and Kentucky. The object in the lower center is a discoidal



Stone pendants and charms



These graceful bowls and vases are ornamented more crudely than many others from Tennessee. Those that are not plain have a few rude incised designs



Pipes of stone and clay carved and modeled in a variety of forms. The Indians of Tennessee and Kentucky were noted even in the earliest days for their huge, elaborately made stone pipes



INTERESTING SPECIMENS FROM THE MASON COLLECTION

The object at the left of unknown use is usually called a "spud"; that at the right is one of the few known specimens of axes with blade and handle complete in one piece of stone. This type of axe forms a connecting link between the archaeology of southeastern North America and northern South America. It is rare in North America but specimens have occasionally been found, especially in the Southeast, while a related form occurs on the Northwest Coast

fancy. There is besides a large and splendid series of grooved axes, including some fine examples of the ridged grooved axe, found most abundantly in that region. Several excellent celts of peculiar form are included, some with triangular longitudinal sections, others with circular cross sections. Some examples have flaring bits, a not common form.

Perhaps the most interesting single specimen is an axe with its handle, worked from a single piece of stone. Such axes are rare in North America, but have occasionally been found, especially in the Southeast; while a related form occurs on the northwest coast, about Puget Sound particularly. A single specimen from within fifty miles of New York City is known to the writer. It is in the hands of a private collector. This type of axe is found in northern South America and in the West Indies (the Museum has a specimen from Caicos Island in the Bahamas), and forms a connecting link between the archæology of southeastern North America and northern South America.

A beautiful example of the problematic polished stone implement called a "spud" is also a much to be desired addition. Another equally fine object of this class, from Kentucky, is in the old Douglass collection. Discoidals, called "chungke" stones from their supposed use in an Indian game of that name, are well represented in the Mason collection, and bell-shaped and straight pestles and grooved and pitted hammer stones are present galore.

There are too few bone and antler implements, only a few awls and needles

being present, but pottery is represented by quite a number of pieces, mostly from graves. These are nearly all plain, and resemble the ware of the lower Mississippi region more than that of the southern Atlantic coast. No painted examples are found. Several vessels



Ornaments of carved steatite. Three of these represent miniature grooved axes

from graves have holes knocked in their bottoms, presumably in conformity with the Indian custom in that region of "killing" all objects placed with the dead, so that the spirit of the utensil may accompany the soul of the deceased on its long journey to the other world.

A PLEA FOR HASTE IN MAKING DOCUMENTARY RECORDS OF THE AMERICAN INDIAN

By Edward S. Curtis

MR. CHARLES DAWSON, in discovering the "Sussex Man" and accompanying flints, aroused the whole civilized world and with the skull restored, scientists the world over began to make their deductions. Even with their learned conclusions before us however, it is a tax upon the imagination to form a picture of the "Sussex Man" as he lived the hypothetical four hundred and fifty thousand years ago. With concentration we gaze upon the skull, touch the flints and try to force our minds back into the hazy dawn of life, expressed only in geological terms — Miocene, Pliocene and Pleistocene. We try but with little success to form a picture of the "Sussex Man," of his mate, his children, his home — a literal picture of the people and of the environment where they wandered contemporary with the strange animals of those remote geological periods.

What is true of man in his earlier types applies to all anthropological records. We value the skull, the skeleton, the artifacts, the clothing; but beyond these we want the documentary picture of the people and their home-land — a picture that will show the soul of the people. In the study of primitive man the interest is more in his psychology than in his economics, more in his songs and prayers than in his implements. In fact, we study his implements that we may get light upon his mental processes.

I desire to add my plea to that of others for prompt work by all of those who would gather first-hand knowledge from the North American Indian. Many take issue with the thought that the

Indian is a "vanishing race." As far as the ethnologist is concerned, this race is not only vanishing but has almost vanished. We are now working late in the afternoon of the last day. Each month some old patriarch dies and with him goes a store of knowledge and there is nothing to take its place. Each year the change in the life is more noticeable and the gathering of material more difficult. What is to be done in the field as far as original research is concerned must be done in the next few years.

In gathering the lore of the Indian one hears only of yesterday. His thoughts are no longer of the present for to-day is but a living death and the hopelessness of to-morrow permeates his very being. If the narrator is nearing the end of his days, he lives over and over again the life when his tribe as a tribe flourished — the time when his people were truly monarchs; if he is a young man and a true Indian, he is a living regret that he is not of the time of the supremacy of his people — when to be an Indian was to be a man.

We have all heard voiced many times that the greatest blot upon the history of the United States is our treatment of the Indian. Having spent a good part of my working lifetime around the camp and council fire, I can only say like the Indian, "Aye! Aye!" to this. Yet our strong sympathy for the Indian must not blind us to the fact that the change that has come has been necessitated by the expansion of the white population and for once at least Nature's laws have been the cause of a grievous wrong. No one will deny however that the inevitable



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SIoux INVOCATION

The Sioux warrior is invoking the supernatural powers to aid him in an undertaking or grant him a revelation. By way of propitiation he is holding a pipe with the mouthpiece toward the gods inviting them to smoke

transformation of the Indian's life has been made infinitely harder by the white man's cupidity. Not only have we been unfair to the Indian; but as a nation rightly and proudly giving considerable study to man, we have also neglected a very great opportunity. Much has been done, it is true — ethnological research of importance has been conducted during recent years — yet a vast amount remains to be done. The American Indians possess many noble traits which were no doubt not common to the average primitive man of the same state of development. By some strange chance the precursors of this branch of the human race were held for ages in the grip of darkness, perhaps due to isolation, perhaps an instance of retrogression. Possibly time will throw light upon the cause. This however is certain: the American Indian has afforded advanced science in an age of civilization an excellent opportunity to study primitive man at a most interesting period. Geologically speaking that period is the

one immediately following the acquisition of implements — the period when he was yet awkward in the use of such tools as his sluggishly inventive brain had evolved, and before the inventive faculty had yet fully awakened to the fact that successful existence depended upon reason more than upon instinct.

Again, the students of the world are searching and analyzing the earliest of the known scriptures, the "Vedas," for insight into primitive religious thought, belief and practice, and here in the United States we have a living "Veda," a great people possessing primitive beliefs and practices. As a nation we have not given even a small fraction of the attention to this subject which it deserves. Financial support has been lacking. Also men with the ability to do justice to the task have turned their attention in other directions. It is not however altogether too late. Let us trust that there will come an awakening and that the utmost will be made of the last of this opportunity.



MUSEUM NOTES

SINCE the last issue of the JOURNAL the following persons have become members of the Museum:

Fellow, MRS. EZRA RIPLEY THAYER;

Life Members, MRS. MAUD W. ADAMS, MRS. PERCY RIVINGTON PYNE, MRS. J. HENRY WATSON, MISS OLIVIA CUTTING and MR. THOMAS M. PETERS;

Annual Members, MRS. A. T. BAILEY, MRS. JOHN S. BASSETT, MRS. DENNIS G. BRUSSEL, MRS. S. G. CANNON, MRS. STUART CROCKETT, MRS. ARTHUR LIPPER, MRS. J. C. W. LOWREY, MRS. WILLIAM MENKE, MRS. HENRY F. DE PUY, MRS. ENOS S. T. RICHARDSON, MRS. DREW KING ROBINSON, MRS. R. L. SPOTTS, MRS. ELIZABETH A. SPADONE, MRS. GRAHAM SUMNER, MRS. CLERMONT H. WILCOX, MRS. JOSEPHINE ZEMAN, MISS EDITH M. CLARK, MISS MINNIE HELEN HICKS, MISS GRACE E. LYNES, MISS HARRIET F. MASSEY, MISS EVA C. PUTNEY, MISS CATHERINE L. RICHARDSON, DR. OTTO KOENIG, DR. GEORGE W. KOSMAK, DR. RUDOLPH F. RABE and MESSRS. EMIL V. KOHNSTAMM, HOWARD V. MEEKS, G. HALL ROOSEVELT, H. ERNEST SCHNAKENBERG, ALEXANDER M. STEWART, and GRAHAM SUMNER.

On Wednesday evening, April 22, a joint meeting of the National Sculpture Society, the Architectural League of New York and the MacDowell Club will be held under the auspices of the American Museum. Mr. Carl E. Akeley will give an illustrated talk on hunting in African jungles and this will be followed by an inspection in the Museum elephant studio of the African hall model which has been constructed under the supervision of Mr. Akeley and of the life size elephant group he has in preparation for this hall, as well as of various of his animal sculptures. This recognition by the artists of New York of the methods and results of the taxidermy developed by Mr. Akeley as in close alliance or even in part synonymous with the work of the sculptor is a step of great importance for the museum of the future. The elephant studio and model of the African hall will be on exhibition to the public on certain days to be announced later but they are open at all times to members and their friends upon presentation of their membership tickets.

THE cover design of this number of the JOURNAL is from the rough clay model made by Mr. A. Phimister Proctor for a lion group to take its place with the various other groups of African animals in the future African hall of the Museum.

THE Copper Queen Mine model, the most elaborate and realistic mine model in any museum, has recently been opened to the public and will be described and illustrated in the May JOURNAL. The data and means necessary for the construction of the model were furnished by Dr. James Douglas and the opening of the model marks the culmination of more than three years of painstaking work on the part of Mr. A. Briesemeister and assistants under the direction of Dr. E. O. Hovey of the department of geology.

THE American Association of Museums will hold its ninth annual series of meetings in Milwaukee on May 19 and 20 and in Chicago on May 21.

IN recognition of his notable achievements in the field of natural science, Professor Henry Fairfield Osborn was presented with a gold medal by the National Institute of Social Sciences on March 20 at the New York Academy of Medicine.

THE President and Trustees of the American Museum have the honor of announcing a special lecture for members, to be given by Sir Francis Edward Younghusband on May 6 at 8:15, the subject being "Tibet and the Entrance to Lhasa." Sir Francis Younghusband was the British commissioner to Tibet in 1902-4, the leader of the British Mission to Tibet, 1903-4 and is already well known to American readers through his various publications among which are *Heart of a Continent*; *Relief of Chitral*; *South Africa of To-day*; *Kashmir*; and *India and Tibet*.

AN exhibition of sculpture, paintings and drawings by Eli Harvey will be held at the Museum from April 6 to April 20. Many members of the Museum are already familiar with Mr. Harvey's work at the New York Zoölogical Park, where he was commissioned in 1901 to do the sculpture for the Lion House, and also with his sculpture in the

Metropolitan Museum of Art and will appreciate the opportunity of seeing his paintings and drawings, which have never before been placed on view.

IN connection with its work with the blind the Museum has prepared twelve globes to be loaned to the public schools in which blind children are taught. These globes were prepared in consultation with the late Gertrude E. Bingham, supervisor of classes for the blind in New York City. They are twenty-six inches in diameter and show the land masses in relief. The expense of the preparation of the globes was met by the Jonathan Thorne Memorial Fund for the blind.

DR. RALPH W. TOWER will lecture in the Summer School of Columbia University on "Bibliography of Natural History Subjects" and the "Administration of a Special Library."

AT the meeting of the American Ethnological Society to be held at the American Museum on April 30, Professor Franz Boas will read a paper on "Indian Mythologies of Alaska and Northern British Columbia."

A GROUP representing a number of deep-sea luminous fishes has just been completed in the Museum and opened to the public. It represents ten species of fishes found in profound depths of the sea, half a mile or more from the surface. Some of the fishes are provided with rows of luminous organs or with headlights, while others have a light at the end of a tentacle with which to attract their prey. The group is illuminated by electricity in such a way that the fishes may be viewed first as synoptic specimens in a case and secondly, as if they were living fishes swimming in the darkness of the deep sea, lighted only by their own luminous or phosphorescent organs. A more detailed account of the group with illustrations will be given in a later issue of the JOURNAL.

THE first of a series of *Monographs of the Pacific Cetacea* by Mr. Roy C. Andrews has just been published in the *Memoirs of the American Museum of Natural History* (new series, vol. 1, part v). This monograph is devoted to the California gray whale (*Rhachinectes glaucus* Cope), which previous to Mr.

Andrews' researches was little known, the knowledge of its habits and external anatomy resting almost exclusively upon the observations made by Captain C. M. Scammon nearly forty years ago. Soon after the publication of Captain Scammon's *Marine Mammalia* in 1874, the gray whale industry began to decline because of the rapid extermination of the species by hunters, and for the last twenty years the gray whale has been lost to science and many naturalists believed it to be extinct.

It was while studying cetaceans upon the coast of Japan in 1910 that Mr. Andrews learned from a whaling company there of the existence of an animal known as the "devil-fish" on the southeastern coast of Korea. From the descriptions given, he believed the animal to be the lost California gray whale and returned to the Orient in 1911 for the purpose of studying the species during the winter fishing season. In that winter more than fifty specimens were taken, from which it was possible to make careful observations of the habits and external characters. Skeletons of two adults were secured, one of which is now in the American Museum and the other in the United States National Museum in Washington. These are the only complete specimens of this species in the world. The California gray whale is on the whole one of the most remarkable of primitive and existing baleen cetaceans and might be called a "living fossil"—yet the work which Mr. Andrews has done has been practically in an untouched field.

In the monographs which are to follow, Mr. Andrews will endeavor to show whether or not the species of whale occurring in the Atlantic and Pacific Oceans are synonymous. Many cetologists believe that almost all of the large whales are cosmopolitan in distribution. This has not been demonstrated because of lack of material, which fortunately the American Museum now possesses.

Two remarkable new fossil mammals are among the rarities of the collections recently obtained from the Lower Eocene of Wyoming. One is a tiny relative of the Notoungulata, an order of extinct Tertiary hoofed animals never found hitherto outside of South America. Its discovery in so ancient a formation in this country raises some interesting problems in ancient geography, for South America is supposed to have been an island continent

during most of the Tertiary, certainly during its early part. Did this animal come from South America or did the South American animals originally come from North America? For this fossil is probably older than any of its known South American relatives. And how, or when did it cross? The other fossil is believed to be a relative of the "flying lemur" (*Galeopithecus*) an oriental animal which has no near living relatives and is placed in an order and family by itself. Nothing was known of its geological history. The discovery of a fossil relative so far back as the Lower Eocene indicates the group really of very ancient lineage.

These animals along with many other new or little known species of the Lower Eocene, will be described in forthcoming articles in the American Museum *Bulletin*.

A CAVE which was broken into by the Copper Queen Consolidated Mining Company at Bisbee, Arizona, has been attractively reproduced in the department of geology and has recently been opened to the public. The cave is typical of those formed in semi-arid regions of Arizona, where the rainfall each year amounts to about ten inches. The cavern was the work of underground water during a period of greater rainfall than at present. The incrustation of the walls occurred later and is due to lime-bearing water seeping slowly through the walls of the chamber and there evaporating at a rate favoring the growth of crystals and crystalline globules. Where the supply of water has been greater or has been concentrated along a crevice or an intersection of crevices, stalactites have formed from the ceiling and corresponding stalagmites have grown upward from the floor. The material for the reproduction was collected by Dr. E. O. Hovey and the cave was made under his direction by Mr. W. B. Peters.

THE PHILADELPHIA ACADEMY OF SCIENCES recently sent to the American Museum for identification the skeleton of a beaked whale which was taken at Corson's Inlet on the New Jersey coast by Mr. Henry W. Fowler. The whale proved to be a full-grown specimen of *Mesoplodon densirostris* Blainville. In 1898 the skeleton of a whale taken at Annisquam, Massachusetts, was secured for the Boston Society of Natural History and identified as Sowerby's beaked whale (*Mesoplodon bidens*). Dr. F. W. True later

studied this specimen and came to the conclusion that it probably represented *Mesoplodon densirostris* but could not be certain because of the somewhat injured skull. This species had only been found hitherto in the Indian Ocean and about Australia but so little is known about the distribution of the beaked whales that Dr. True did not consider this circumstance of great weight. The specimen sent by the Philadelphia Academy of Sciences has shown that the identification of the Massachusetts specimen as *Mesoplodon densirostris* was undoubtedly correct and not only definitely introduces into the North American fauna this interesting species but also gives important evidence as to the cosmopolitan wanderings of the whales of this rare genus.

WHEN the articles on museum groups were written the Laysan group at the University of Iowa was not completed. Since that date the last touches have been added to the background and a few figures will give an idea of the extent of this remarkable habitat group. [The cut in the February JOURNAL naturally shows but a small portion as the group is cycloramic in its nature.] The painted background is 138 feet long and twelve feet high; the foreground covers four hundred feet and not less than twenty-three species of birds are shown. As Mr. Homer R. Dill says, there are not many places where animal life is so abundant that a faithful reproduction of so many species of birds could be exhibited in so comparatively small a space.

THE department of anthropology has just purchased from Mr. J. B. Heffernan of Colorado Springs a collection of pottery from southern Utah. The collection consists of eighty pieces almost all of which are in black and white and in perfect condition.

DR. P. J. OETTINGER has recently presented to the Museum a very complete collection of Mexican woods from the state of Oaxaca. These woods were exhibited at the Paris exposition in 1899 and represent eighty-seven species. They are in an excellent state of preservation.

DR. C.-E. A. WINSLOW, curator of the department of public health, has been appointed chairman of the subcommittee on sanitation, of the Advisory Council of the New York City Department of Health.

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THE AMERICAN MUSEUM JOURNAL



THE NEW AFRICAN HALL PLANNED
BY CARL E. AKELEY

WHICH SETS A NEW STANDARD IN
MUSEUM EXHIBITION IS DESCRIBED
AND FIGURED IN THIS ISSUE

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The Museum is open free to the public on every day in the year.

The American Museum of Natural History was established in 1869 to promote the Natural Sciences and to diffuse a general knowledge of them among the people, and it is in cordial coöperation with all similar institutions throughout the world. The Museum authorities are dependent upon private subscriptions and the dues from members for procuring needed additions to the collections and for carrying on explorations in America and other parts of the world. The membership fees are,

Annual Members.....	\$ 10	Fellows.....	\$ 500
Sustaining Members (annually)....	25	Patrons.....	1000
Life Members.....	100	Associate Benefactors.....	10,000
Benefactors (gift or bequest)		\$50,000	

The Museum Library contains more than 60,000 volumes with a good working collection of publications issued by scientific institutions and societies in this country and abroad. The library is open to the public for reference daily — Sundays and holidays excepted — from 9 A. M. to 5 P. M.

The Museum Publications are issued in six series: *Memoirs*, *Bulletin*, *Anthropological Papers*, *American Museum Journal*, *Guide Leaflets* and *Annual Report*. Information concerning their sale may be obtained at the Museum library.

Guides for Study of Exhibits are provided on request by the department of public education. Teachers wishing to bring classes should write or telephone the department for an appointment, specifying the collection to be studied. Lectures to classes may also be arranged for. In all cases the best results are obtained with small groups of children.

Workrooms and Storage Collections may be visited by persons presenting membership tickets. The storage collections are open to all persons desiring to examine specimens for special study. Applications should be made at the information desk.

The Mitla Restaurant in the east basement is reached by the elevator and is open from 12 to 5 on all days except Sundays. Afternoon Tea is served from 2 to 5. The Mitla room is of unusual interest as an exhibition hall being an exact reproduction of temple ruins at Mitla, Mexico.

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**THE HONORABLE JOSEPH H. CHOATE,
DIPLOMATIST, LAWYER, SPEAKER**

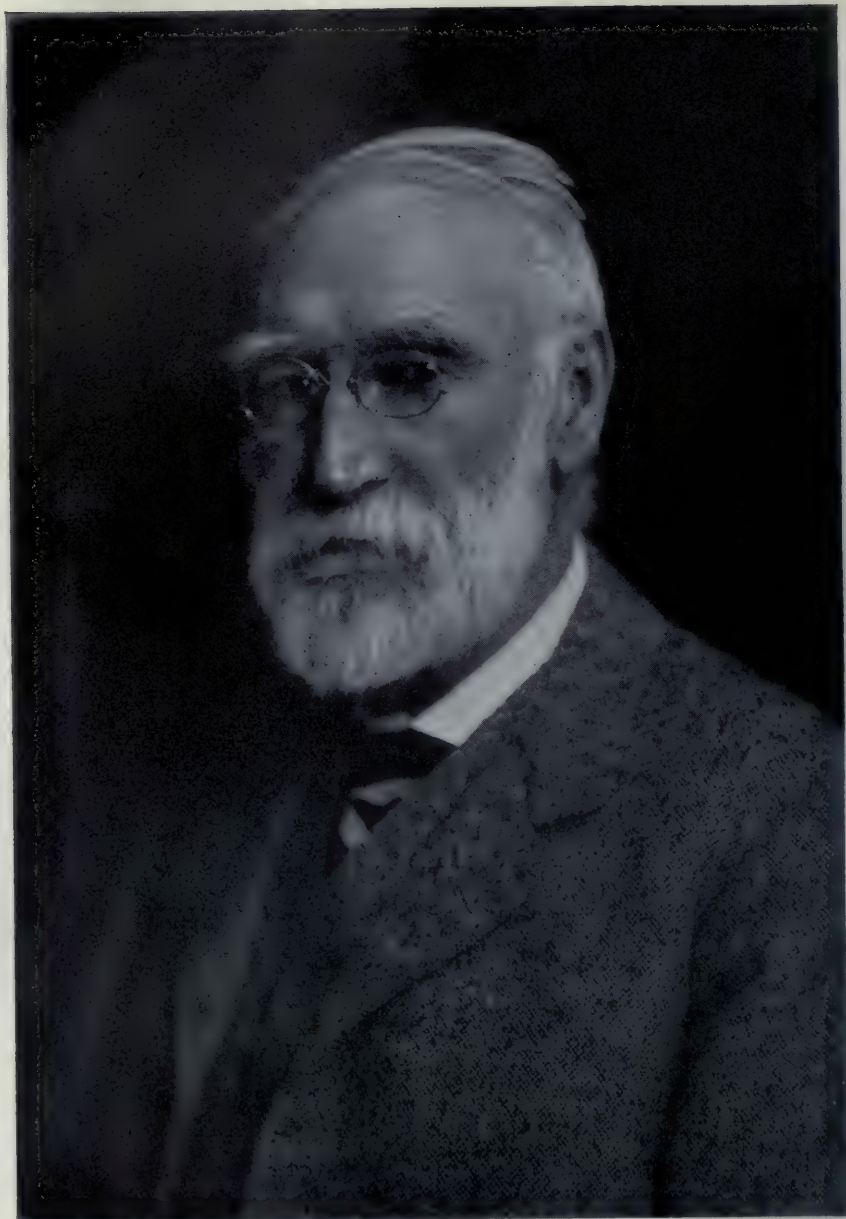
Mr. Choate is the only surviving representative of the founders of the Museum. In 1869 Mr. Choate with Mr. Charles A. Dana and Mr. Theodore Roosevelt, Sr., drafted the constitution for the American Museum of Natural History. Since that early time Mr. Choate has given continually of his means and time and, as legal adviser, especially of his intellect to the welfare of the institution



*Photograph by Kermit Roosevelt, reproduced
through the courtesy of Scribner's Magazine*

COLONEL THEODORE ROOSEVELT WITH COLONEL RONDON

Colonel Roosevelt has just returned from an expedition to South America. He will give his first report of the zoölogical results of this expedition before the members of the American Museum in November. Colonel Rondon of the Brazilian Army, who has explored western Brazil for twenty-four years in pioneering the way for railroads and telegraph lines, joined Colonel Roosevelt at Caceres on the Paraguay and rendered the expedition invaluable services



Photograph by the Misses Selby

DR. JAMES DOUGLAS OF NEW YORK

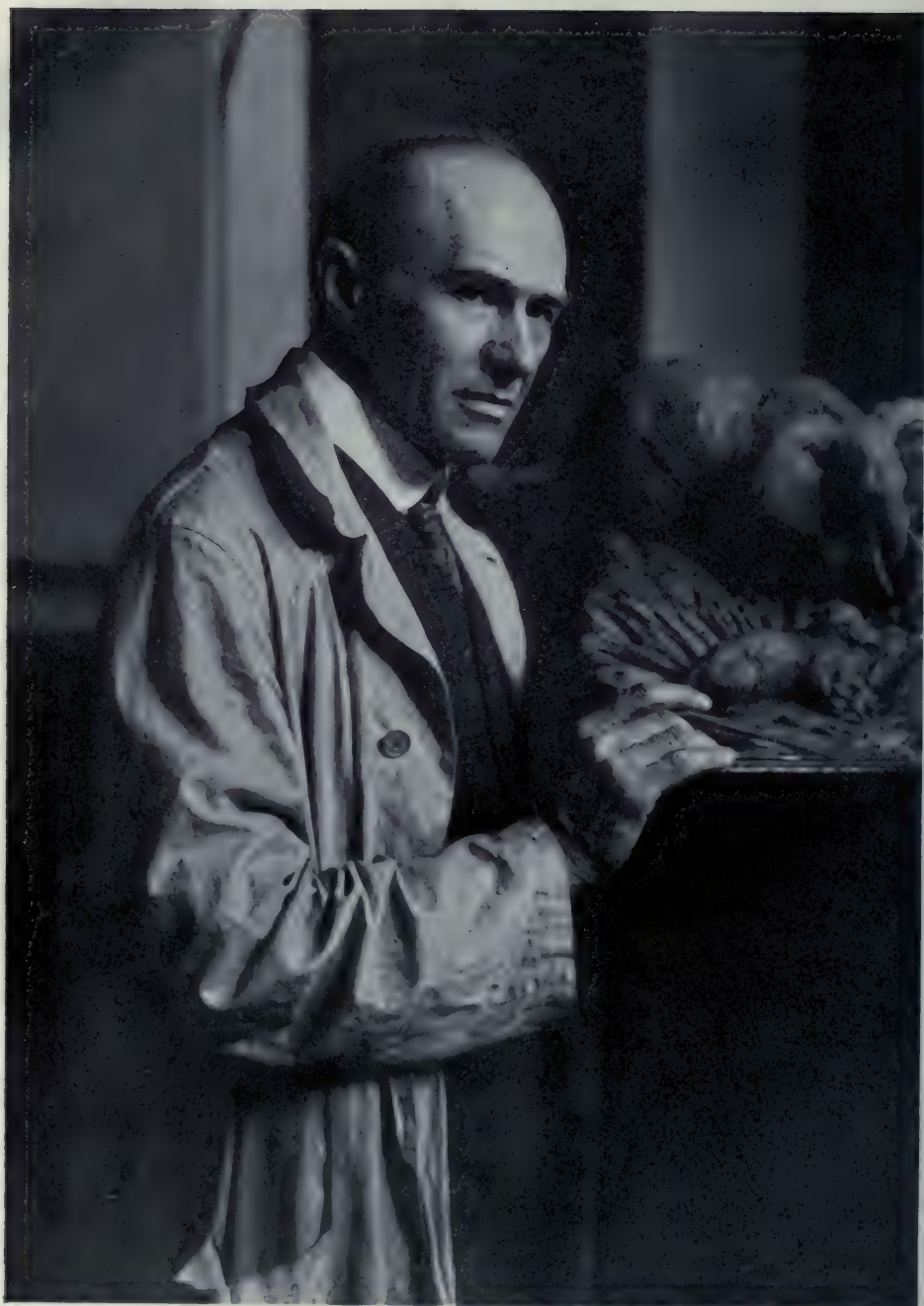
Dr. Douglas, expert mining engineer and president of the Copper Queen Consolidated Mining Company, furnished scientific data for the construction of the Copper Queen mine model in the American Museum. He has also financed the construction and given it his personal supervision during the past three years



Courtesy of the American Press Association

HIS SERENE HIGHNESS ALBERT, PRINCE OF MONACO

His Serene Highness Albert, Prince of Monaco, expert and author in oceanography, founder at Monaco of the largest oceanographical museum in the world, addressed the members of the American Museum of Natural History at the time of his recent visit to America on the subject of his work



MR. CARL E. AKELEY

Mr. Akeley has advanced the art of taxidermy until it implies to-day a combination of the powers of explorer, naturalist and sculptor

THE AMERICAN MUSEUM JOURNAL

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THE NEW AFRICAN HALL PLANNED BY CARL E. AKELEY

PRINCIPLES OF CONSTRUCTION WHICH STRIKE A REVOLUTION IN
METHODS OF EXHIBITION AND PRESAGE THE FUTURE GREATNESS
OF THE EDUCATIONAL MUSEUM

With detailed description of the African Hall model constructed under the
supervision of Mr. Akeley

RAPID progress has been made in America in recent years as regards methods of realistic exhibition of animals in museums; witness the famous mammal groups in the Field Museum, the cycloramic group showing the birds of Laysan Island in the Museum of the University of Iowa, and the habitat bird groups of the American Museum, as also in the American Museum the new reptile groups which show what can be accomplished with wax as a medium, and the wharf-pile group developed in glass. It is unnecessary even to suggest comparison with the often crudely mounted mammals and birds and the discolored shapeless alcoholic material that made up exhibits a few years ago and still in both large and small museums here and abroad often meet the eyes of the visitor seeking instruction in natural history.

Mr. Carl E. Akeley when speaking recently before a joint meeting of the National Sculpture Society, the Architectural League of New York and the MacDowell Club, present at the Museum to view the model of the new African hall, illustrated well the need that existed for advance in the methods of animal exhibition. We quote his story in which he humorously tells of his

own early experience in the work of mounting animals:

When I was a boy I learned taxidermy on my own hook. I borrowed a book that had cost one dollar and from that book I learned taxidermy up to a point where I felt justified in having business cards printed stating that I did artistic taxidermy in all its branches. One day armed with that card I went to the city of Rochester where was located the godfather of all museums, Ward's Natural Science Establishment. After walking up and down in front of Ward's house a number of times, trying to screw up my courage to go in and make application for a position, I finally got my hand upon that card and was reassured. I went in, presented the card to Professor Ward and I assure you he jumped at the opportunity to secure my services — at \$3.50 per week.

Thus I went to Ward's and learned to stuff animals. I have a theory that the first museum taxidermist came into existence in about this way: One of our dear old friends, an old-fashioned closet naturalist who knew animals only as dried skins and had been getting funds from some kind-hearted philanthropist, one day under pressure from the philanthropist, who naturally wanted to see some result from all this money put into the hands of a scientist, sent out around the corner and called in an upholsterer and said, "Here is the skin of an animal. I want you to stuff this thing and make it look like a live animal." The upholsterer did it and kept on doing it until the scientist had a little more money given to him for work. After a while the upholsterer became ambitious and



MRS. CARL E. AKELEY, WHO ACCOMPANIED HER HUSBAND DURING THREE YEARS OF AFRICAN FIELD WORK

had an idea that these animals might be improved upon so he began to do a little better work. But it took more time and cost more money so he lost his job. Thus it has been that from the very people from whom we expected the most encouragement in the beginning of our efforts, we got the least.

I remember very well one time when an opportunity came to do something a little better. A zebra was brought into the Establishment. I had been studying anatomy and I had learned the names of all the muscles and all the bones. When I saw the zebra I realized that here was an opportunity to do something good and I asked to make a plaster cast of the body. I had to do it in my own time and worked from supper until breakfast time, following out a few special experiments of my own in the process. Nevertheless the zebra was handed out to be mounted in the old way and my casts were thrown on the dump.

Fortunately the story does not end here. Let us continue it in a quotation from Professor Henry Fairfield Osborn's introduction of Mr. Akeley before these societies of artists:

Now all this is changed and Mr. Akeley is the leader of a new movement. He is the first sculptor in this art, the first taxidermist to approach the art from the standpoint of a sculptor instead of from the standpoint of simply filling out the skin, and his great contribution, that which I am sure will make his name endure, is that every one of his animals is first modeled as if the model were to be the completed thing itself. On the surface of the model he succeeds in expressing the muscles, tendons and bones, just as they appear in the living animal. Then he thins the skin down to the utmost possible degree of fineness and applies it to this piece of finished sculpture so that the skin here, as in the case of the living animal, is drawn down over the beautifully modeled body.

Another great feature of Mr. Akeley's work, which makes him a leader in the new movement, is that through his courage as an explorer he has been out and studied his types in the wild, often at very great personal risk. The animal of the wild is entirely different from the museum or menagerie animal. The muscles, the vitality make the whole aspect something quite different. It

is the wild animal that Mr. Akeley will put into the new African hall.

What has been done so far however to improve museum exhibition is but a small beginning of what can be and should be done, especially in the museums of large cities where the educational need is greatest. Any person who has studied the matter or who is interested either as artist or scientist, will agree to this as he walks through the exhibition halls of any of the world's public natural history museums. In few can there be found a single hall whose plan reveals a master mind or correlation in the work of several minds. There are chances for the architecture to be out of harmony with the subject or character of the exhibits, for the lighting to be unfortunately managed. Owing to an institution's inheritance of old material and frequent changes of administration, the exhibits may be heterogeneous, a little done here by one man with one aim, a little yonder by another with a different aim; they are no doubt crowded and with small appearance of attractiveness. The cases may be out of keeping with the exhibits, perhaps even ranging through many styles and sizes. All this in addition to the fact that the animals were prepared for exhibition by some method which gives no illusion of life.

Mr. Akeley stands foremost among museum men interested in museum exhibition—an African explorer, naturalist and sculptor, and the title he modestly claims, "taxidermist"—a man with such capacity for keen observation of animals and such genius in a true representation of them that he honors the old term taxidermist until whatever lowly origin the word may have had, it is made now to imply a combination of the powers of explorer, naturalist and sculptor. By thus remaining loyal to the



MODEL OF AFRICAN HALL

Side view showing arrangement of exhibits on main floor, and spaces at sides of main floor and gallery to be occupied by panoramic groups and bronzes as shown on page 181. The elephant group now being mounted at the Museum will occupy the central position on the main floor and will be flanked at either end by a bull, cow and calf of the black and the white rhinoceros respectively and also by a native figure in bronze [fountain]. These two native figures will be life-size and will serve as a scale to the dimensions of the hall



MODEL OF AFRICAN HALL

View showing main floor installation from entrance to hall. Mr. Akeley has so advanced methods of taxidermy that these elephant and rhino groups will be permanent without protection from dust and changing atmospheric conditions, requiring only the care given to bronzes

old name and continuing to give his services in his old profession, Mr. Akeley has set a new standard for all workers in museum preparation, moreover making it possible that men of great ability shall come into the ranks and impossible for men of poor ability to rise there. This in itself, striking as it does at the foundation for improvement, is bound to influence museums in the future. Fortunately however and yielding more immediate and definite results than this, Mr. Akeley has crystallized into workable plans the ideas gained through his study of museum exhibition. These were largely perfected some years ago for the Field Museum, Chicago, but are now offered in more matured form to the American Museum in the shape of an African hall for the new wing under construction.

During the past year working in one of the old North American mammal halls of the second floor of the Museum, rechristened the "elephant studio," Mr. Akeley has supervised the construction of a very beautiful model of the African hall. The following is his own description of the hall as portrayed by the model:

This new hall will be devoted entirely to Africa — to African scenes and African animals and African natives in their relation to the animals. The hall proper will have a floor measurement of sixty by one hundred and fifty-two feet and a height of seventeen feet to the gallery at the sides and thirty feet to the ceiling over the center. The open space of this hall will be encroached upon only at the corners by the elevators, that is the actual open floor space without columns or any obstruction whatever will be sixty by one hundred and sixteen feet. In the center of this large hall will stand a group of four African elephants treated in statuesque fashion, mounted on a four-foot base with no covering of glass. It is suitable that the elephant should dominate this hall since it is typical of Africa, is the largest land mammal

in the world to-day and one of the most splendid of all animals of past or present.

As a result of late developments in the technique of taxidermy we are able to treat these pachyderms so that they will not suffer because of lack of protection under glass. Changing atmospheric conditions will have no effect upon them and they can receive essentially the care given to bronzes.

The elephant group will be flanked at one end by a group of black rhinos, a bull at one side, a cow and calf at the other, and at the other end by a similar group of white rhinos, the rhino groups being prepared for the same exposure as the elephant group. The elephants and the rhinos, with the addition of two fountains, one at either end facing the entrances of the hall and consisting each of a single native figure, life-size in bronze, will constitute the only installation in this hall proper.

If we stand in this hall where are the elephants and rhinos and look to right and left out through what might seem the windows of the hall, we shall see typical African scenes, for the groups of the African hall will surround the main floor in a sort of annex which will not encroach upon the measurements of the hall proper. These animal groups with panoramic backgrounds¹ will be twenty in number on the main floor, with twenty more of the same type although somewhat smaller in dimensions, in the gallery.

The forty canvases for the groups will be painted by the best artists available and from studies made in Africa, and will give a comprehensive idea of the topography of Africa from the Mediterranean on the north to the Tableland Mountain at Cape Town and from the east coast to the west coast.

The foregrounds of the groups will combine to represent in the most comprehensive way the animal life of the continent. They will be composite — that is, as many species will be associated in each of the groups as is legitimate with scientific fact. For example one of the large corner groups will represent a

¹ The paintings making the backgrounds of these forty groups will range in size as follows:

In the gallery, canvas measurement 16 feet by 28 feet for groups 13 feet in width by 7½ feet in depth

On the main floor, canvas measurement 30 feet by 70 feet for the four large corner groups, 24 by 24 feet

Also on the main floor, canvas measurement 25 feet by 42 feet for sixteen groups each 15 by 13 feet



FINISHED CORNER OF AFRICAN HALL MODEL

This shows three of the twenty large panoramic groups and two of the twenty-four bronze panels of the main floor. The backgrounds of these twenty panoramic groups supplemented by the twenty smaller groups of the gallery are planned to give a comprehensive idea of the topography of the continent of Africa, each one being used as a background for a group of animals characteristic of the region shown. The bronze panels are treated as a part of the decoration of the hall, subordinate in a sense but of great importance, as the theme of the whole series is to show the relationship between the natives of Africa and the animal life

scene on the equatorial river Tana, showing perhaps all told twelve species in their natural surroundings with stories of the animals and a correct representation of the flora. In the foreground on a sandbar in the river will be a group of hippos; across the stream and merging into the painted background, a group of impalla come down to water; in the trees and on the sandbars of the farther bank two species of monkeys common to the region; a crocodile and turtles basking in the sun near the hippos and a few characteristic birds in the trees.

Another of these large corner groups will be a scene of the plains, a rock kopje with characteristic animals such as the kilpspringer, hyrax, Chanler's reedbuck and baboons on

the rocks. The background will lead off across the plain showing a herd of plains animals — and the adjoining group will continue the story showing more of the species of the plains. The third of the large corner groups will represent a Congo forest scene with the okapi and chimpanzee perhaps, and such animals as may be legitimately associated with the okapi. The fourth group is to be a desert scene, a water hole with a giraffe drinking and other animals standing by, awaiting their turn.

In these four corner groups we can present the four important physical features of African game country and they will be supplemented of course by the scenes in the thirty-six other groups. The large groups however,



Sketch model of the hippopotamus group, one of the four large corner groups on the main floor. A scene on the Tana River, showing a hippopotamus family on a rock in the center of the river and an antelope drinking on the opposite shore. There will be several other species of mammals and birds shown as accessories in this group

give opportunity for particularly striking scenic effects.

Lack of care in museum exhibition has come about in part at least because of the lack of permanence in the specimens exhibited. Now that we have reached a point in the development of taxidermy technique where we can say without reservation that our preparations are permanent, permanent to a degree only dreamed of up to within a couple of years, we feel justified in taking extreme measures to insure the future care and preservation of these preparations. The elephants and rhinos can be made as permanent as bronze for endurance under all conditions, but the other animal groups with

rays of light. The space between these two skylights will be a cooling space — that is, air will circulate through this space, modifying the heat of the summer sun or the cold of winter. Each group will be in fact within an individual compartment, and allowed to “breathe” only the air of the alleyway, which is filtered and dried and kept at a uniform temperature throughout the year. The daylight admitted through the skylight is under automatic control so that after the amount of lighting of an individual group has been definitely determined upon, it is kept at the proper amount by automatically controlled shutters which open and close with the changing light, maintaining a uniform light



Lion and Buffalo — A model for bronze by Carl E. Akeley

their backgrounds and with accessories necessarily made largely of wax, cannot be thus exposed. That they shall not suffer from excessive light and from changing atmospheric conditions, they will be placed in these two great alleyways on either side of but practically outside the hall, in fact hermetically sealed off from the hall proper and also from the outside atmosphere. Thus each group will be absolutely protected from changes in temperature and humidity.

The lighting of the groups will be a combination of daylight and artificial light. Daylight will be admitted through a skylight beneath which a second skylight will serve as a ray-filter to cut out the actinic or fading

on the group under all conditions.

The amount of light required on these groups will be relatively small because of the fact that they are to be viewed from a relatively dark central hall. We shall be looking from the hall into the source of light rather than from the source of light outward. Also reflections can be reduced to a minimum and practically eliminated, owing to the fact that the groups are the source of illumination, by having the glass in the front of the case inclined at such an angle that it reflects only the dark floor of the hall. The effect as we pass through this hall will be that of looking out through open windows into an African out of doors.



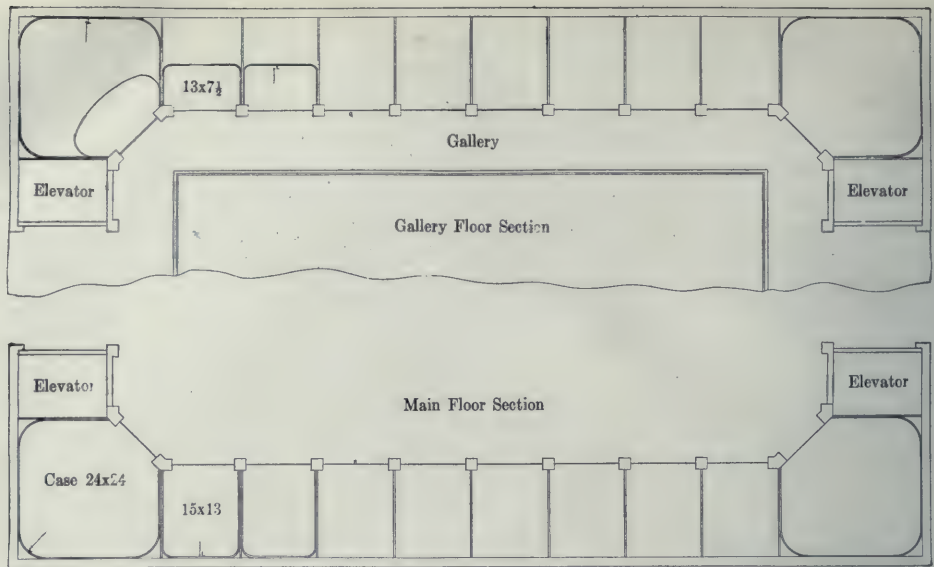
MODEL FOR BRONZE BY CARL E. AKELEY

Charging herd of elephants. Based on one of Mr. Akeley's experiences in Africa when a herd of eleven cow elephants charged on wind from a distance of four hundred yards



A CORNER OF THE ELEPHANT STUDIO

Mr. Akeley working on the model of the big bull elephant which is to be the central figure of the African hall



Plan of hall showing main floor and gallery of African hall

In addition to the forty groups twenty-four bas-relief panels in bronze (six by eleven feet each) will be placed in a frieze just above the floor groups and along the balcony to form a series around the entire lower floor, becoming a part of the architectural decoration of the hall. The sculpture of each panel will tell the story of some native tribe and its relations to the animal life shown in the groups.

For instance, one will show a Dorobo family, the man skinning a dead antelope that he has brought in from the forest to his hut, where are his wife and babies and two hunting dogs which represent their only domestic animals. A further interest in animal life will be revealed in the presence of the dead antelope as it is a source of food supply, for these are people that live entirely by hunting. Another panel may show a group in Somaliland with camels, sheep, goats, cattle and ponies at a water-hole, the interest in animal life being practically only in domestic animals. Still another panel completing the Somali story will represent a group of Midgans in some characteristic hunting scene. While each of these panels is to be a careful and scientifically accurate study of the people and their customs, accurate in detail as to clothing, ornaments and weapons, the theme running through the whole series will be

the relationship of the people to the animal life.

Thus the American Museum takes the important step of putting this comprehensive piece of work into the hands of one man and he a man who has proved his peculiar ability. Mr. Akeley is willing to sacrifice other interests for the five years necessary for the well launching of the plan. He will draw into the work the best "taxidermists," as well as sculptors and artists. He will in fact start a "taxidermy studio" which during these five years will be not only a place where groups for the African hall shall be prepared but what is more important, will also prove a training-ground for young men of ability and marked aptitude for the work. We can but agree that Mr. Akeley has put his finger upon the crucial difficulty in Museum exhibition when he says, "After all is said and done such work depends on just a few men who can carry it out. To find people who can do the work, men of fit training and sense to carry it to the finish, that is the difficult matter."

It is impossible for us to estimate the vast influence that Mr. Akeley's new "taxidermy studio" will have on museum installation. It will achieve a direct influence in presenting to the world such an example as the African hall will be when embodied forth in its full dimensions — a place of large and quiet beauty, with long unobstructed views, where one

may sit and rest while he learns of the life of Africa. There is certain to come also a stimulated enthusiasm for work in museum exhibition and results continually approaching more and more near the ideal — that is, absolute scientific truth giving an illusion of the life itself, combined with great beauty and with permanence.

M. C. D.

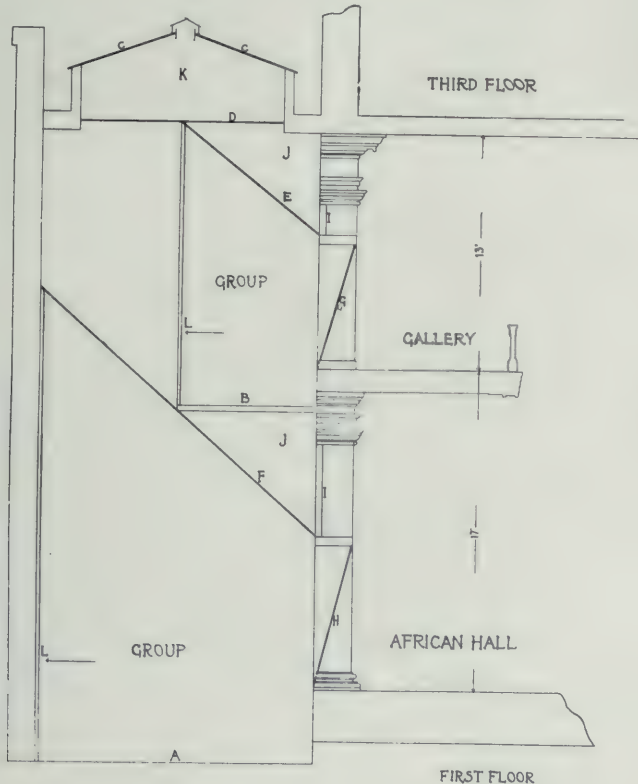
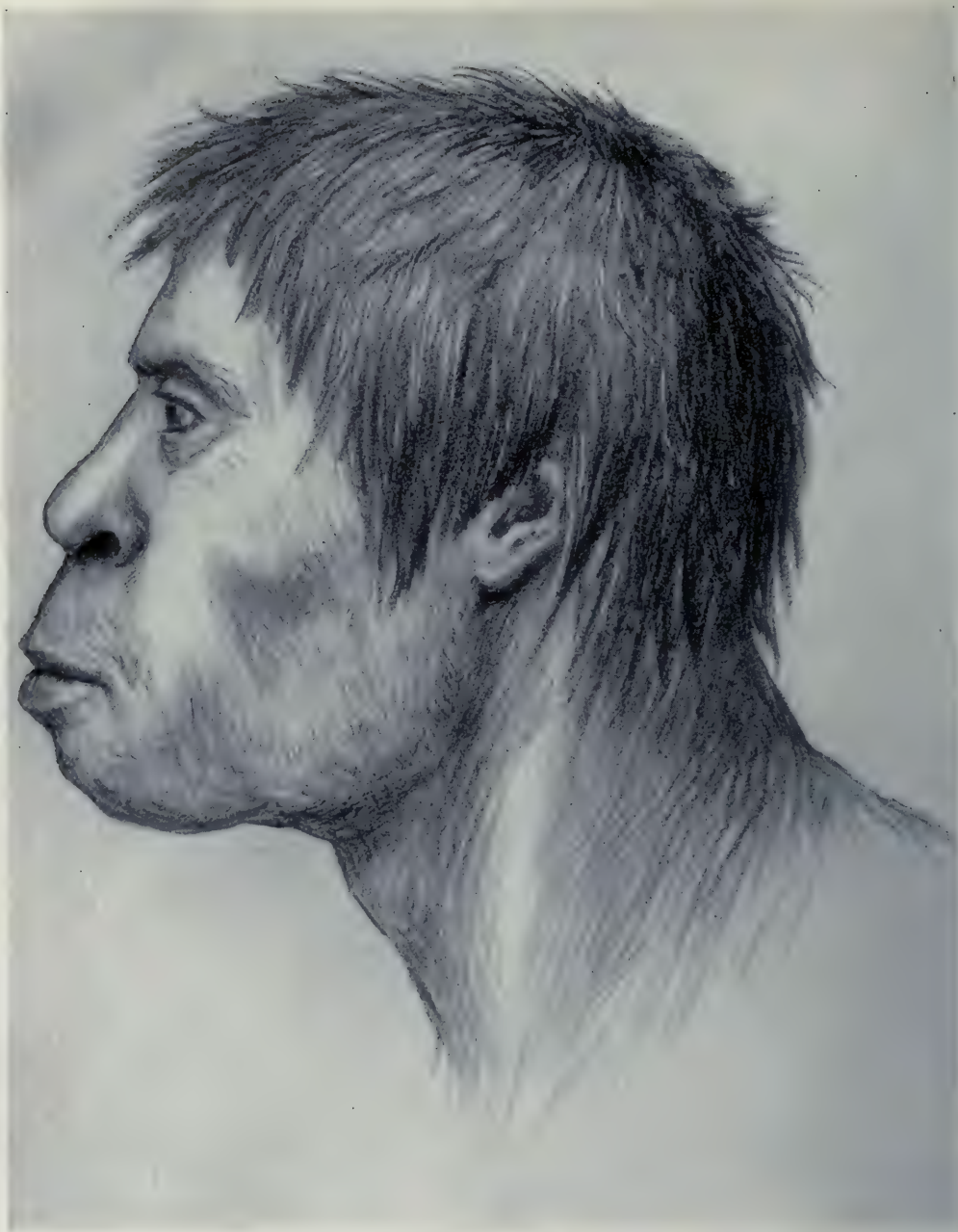


Diagram of a section of the corridor containing main floor and gallery groups

- A. Floor of group space, sunk four feet below the level of hall floor to permit of various elevations of foreground in group;
- B. Floor of gallery group case, two feet below the level of gallery floor;
- C. Skylight;
- D. Ray filter. Colored glass to cut out actinic rays of daylight;
- E. Glass roof of gallery group case;
- F. Glass roof of main floor group case;
- G. Glass in front of gallery case set at angle to cut out reflections;
- H. Glass in main floor case;
- I. Space occupied by bronze panels above the floor groups;
- J. Space above gallery groups to be used for artificial lighting purposes;
- K. Ventilated space between skylight and ray filter;
- L. Plane of painted background.



THE PILTDOWN MAN IN LIFE

Fig. 1. A restoration by Professor J. H. McGregor

THE DAWN MAN OF PILTDOWN, ENGLAND

By William King Gregory

SEVERAL years ago an English geologist, Charles Dawson, F. S. A., F. G. S., was walking along a farm road close to Piltdown Common, Fletching, Sussex, when he noticed that the road had been mended with some peculiar brown flints not usual in the district. On inquiry, he relates,¹ he was

¹ Quar. Jour. Geol. Soc., vol. 69, pp. 117-144
Paper read Dec. 18, 1912.

[NOTE: The now celebrated fossil human remains found at Piltdown, in Sussex, continue to excite widespread discussion and interest not only in scientific circles but also in the public press both here and abroad. The following summary has been made after a patient and impartial study of this still controversial subject. The Dawn Man is illustrated by means of casts and models which are on exhibition in this Museum, in the loan collection of Dr. J. Leon Williams.]

astonished to learn that the flints were dug from a gravel-bed on a certain farm, and shortly afterward he visited the place, where two laborers were at work digging the gravel for small repairs to the roads. As this excavation was situated about four miles north of the limit where the occurrence of flints overlying the Wealden strata is recorded, Mr. Dawson was much interested, and made a close examination of the bed. "I asked the workmen," he says, "if they had found bones or other fossils there. As they did not appear to have noticed anything of the sort, I urged them to preserve anything that they might find. Upon one of my subsequent



Fig. 2. Model of the Piltdown skull as reconstructed by Dr. Smith Woodward. Seen from the left side; one-half natural size. Williams Collection, American Museum

The dark areas represent the portions preserved in the original fossil; the light areas are restored. The lower jaw (except the front part) is restored from the opposite side

visits to the [gravel] pit, one of the men handed to me a small portion of an unusually thick human parietal bone. I immediately made a search, but could find nothing more, nor had the men noticed anything else. The bed is full of tabular pieces of iron-stone closely resembling this piece of skull in color and thickness; and, although I made many subsequent searches, I could not hear of any further find nor discover anything—in fact, the bed seemed to be quite unfossiliferous.” But incited by the skull fragment already obtained, Mr. Dawson renewed the search in the autumn of 1911, when he was rewarded for his persistence by picking up among the rain-washed spoil-heaps of the gravel-pit, another and larger piece belonging to the frontal region of the same skull. “As I had examined a cast of the Heidelberg jaw,” he continues, “it occurred to me that the proportions of the skull were similar to those of that specimen. I accordingly took it to Dr. A. Smith Woodward at the British Museum [Natural History] for comparison and determination. He was immediately impressed with the importance of the discovery, and we decided to employ labor and to make a systematic search among the spoil-heaps and gravel, as soon as the floods had abated; for the gravel-pit is more or less under water during five or six months of the year. We accordingly gave up as much time as we could spare since last spring (1912), and completely turned over and sifted what spoil-material remained; we also dug up and sifted such portions of the gravel as had been left undisturbed by the workmen. . . . Apparently the whole or greater portion of the human skull had been shattered by the workmen, who had thrown away the pieces unnoticed. Of these we recovered from the spoil-heaps as many fragments as

possible. In a somewhat deeper depression of the undisturbed gravel I found the right half of a human mandible. So far as I could judge, guiding myself by the position of a tree three or four yards away, the spot was identical with that upon which the men were at work when the first portion of the cranium was found several years ago. Dr. Woodward also dug up a small portion of the occipital bone of the skull from within a yard of the point where the jaw was discovered, and at precisely the same level. The jaw appeared to have been broken at the symphysis, and abraded, perhaps when it lay fixed in the gravel, and before its complete deposition. The fragments of the cranium show little or no sign of rolling or other abrasion, save an incision at the back of the parietal, probably caused by a workman's pick.¹”

Further exploration during 1913 resulted in the finding, by Father P. Teilhard de Chardin, S. J., of an apelike canine tooth in the dark bed of the gravel, the same stratum which had yielded the skull and the mandible. The nasal bones were also found in the same bed.

GEOLOGICAL AGE OF THE PILTDOWN MAN

The question of the geological age of these now celebrated specimens is naturally of first importance. It has been suspected by some that geologically they are not old at all; that they may even represent a deliberate hoax, a negro or Australian skull and a broken ape-jaw, artificially fossilized and “planted” in the gravel-bed, to fool the scientists. Against this suggestion tell the whole circumstances of the discovery as above

¹ “This wretched pickaxe added yet another obstacle. It cut off the fore-part of the jaw, bearing the front cheek-teeth, the ‘eye’ teeth, or canines, and the cutting-teeth.” W. P. Pyecraft

related. None of the experts who have scrutinized the specimens and the gravel-pit and its surroundings has doubted the genuineness of the discovery. All agree that the Dawn Man dates at the very latest from the Old Stone Age, and for the following reasons:

1 — The dark stratum which yielded the human remains also contained a number of mammalian fossils, representing a primitive elephant (*Stegodon*), a mastodon (*Mastodon arvernensis*), a rhinoceros, a hippopotamus, a horse and a beaver. The mastodon and the stegodon belonged to species which were characteristic of the Pliocene epoch and on that account Professor Keith at first regarded the human remains as equally old; but Dr. Smith Woodward and Mr. Dawson maintained that the mastodon and rhinoceros teeth had been washed into the gravel bed from an older formation, because they had been rolled and were water-worn. The hippopotamus and the beaver may be of either Upper Pliocene or Pleistocene age. A fragmentary fossil antler of a red deer was found near by, but its association with the other remains is doubted.

2 — "Eoliths," or irregularly fractured flints, were also found in and around the gravel-pit.

3 — One flint implement of Old Stone Age type was discovered *in situ* in the bed which lies immediately above the Dawn Man stratum. (See also Fig. 11.)

In brief, the discoverers of the Dawn Man finally refer his remains to the Palæolithic (Old Stone Age),¹ but the more precise date is not settled.

DR. SMITH WOODWARD'S RECONSTRUCTION OF THE SKULL AND JAW

The broken pieces of the Piltdown

¹ Supplementary Note on the Discovery of a Palæolithic Human Skull and Mandible at Piltdown (Sussex). Proc. Geol. Soc., London, vol. lxx, 1914, pp. 82-93.

skull were compared by Dr. Smith Woodward with various human types both prehistoric and modern, and under his direction the pieces were assembled as far as possible in their natural positions and the missing parts were hypothetically restored in clay. As shown in this reconstruction (Page 189) these missing parts (indicated by the white areas) include the front part of the lower jaw, the lower incisors, canines and premolars, all the upper teeth and the face. Since that time the nasal bones and one canine tooth have been found.

The most extraordinary, unexpected feature of the Piltdown man, as thus reconstructed, is that an essentially human brain case, with a well-rounded forehead and with thoroughly human temporal and occipital regions, is combined with an essentially apelike lower jaw, with apelike teeth and with an apelike face (the latter hypothetical).

DID THE APELIKE JAW BELONG WITH THE HUMAN BRAIN-CASE?

Doubts and criticisms were raised at once. Doubt as to the association of the lower jaw with the skull was expressed by several authorities (Sir Ray Lankester, Professor Waterson and Professor Schwalbe) and is still entertained by many conservative anatomists. Did this ape jaw really belong with the human brain-case? Could an ape jaw articulate with a human jaw-socket?

Briefly summarized the principal items of evidence bearing on this question are as follows:

1 — The jaw was found in the same stratum which had yielded the skull, and within a yard of the exact spot where a piece of the occipital bone was found. Subsequently the nasal bones and a canine tooth were found in the same place.



Fig. 3. The Piltdown lower jaw (B) from a cast in the Williams Collection, compared with the jaws of a female orang-utan (A) and of a modern man (negro) (C). External views, three-fourths of the natural size. Abbreviations: *alv. m3*, socket for third lower molar; *a. r.*, ascending ramus; *c*, canine; *c. i.*, central incisor; *con.*, condyle; *l. i.*, lateral incisor; *m1, m2, m3*, first, second, third lower molars; *p1, p2*, first and second premolars (equivalent to the third and fourth premolars of lower mammals)



Fig. 4. Lower jaw bones of the Piltdown man, of a female orang-utan and of a modern negro, viewed from the inner side. Abbreviations as in Fig. 3; also, *alv. c. i.*, alveolus for central incisor; *ch.*, bony chin; *g. t.*, genial tubercle; *m. l.*, mental ledge; *t. r.*, ridge in area of temporal muscle; *s*, section through symphysis

2—The jaw and skull are fossilized in the same manner and degree.

3—They were found in an ancient gravel-bed containing the débris of older deposits. "As the skull and lower jaw are very little water-worn, they would not have occurred in close association if they had been transported far from

cene Age have been discovered in the glacial and interglacial deposits of England and the Continent, but in this highly varied fauna the anthropoid apes have always been conspicuously absent, and there is no reliable evidence that any of the race ever lived in England during the Pleistocene Epoch.



Fig. 5. The same three specimens of Figs. 3 and 4, viewed from above. Abbreviations as in previous figures; also, 1, 2, 3, 4, 5, cusps of the lower molars; *m. p.*, median plane; *, broken edge

the spot at which they were originally entombed" (Smith Woodward).

4—The suggestion that while the brain-case was human, the lower jaw belonged to another creature, an ape, is not in harmony with what is already known of the fauna and climate of Europe during Pleistocene times. Thousands of mammalian remains of Pleisto-

5—Fossil remains of anthropoids of any age have hitherto been exceedingly rare, and the chances that a jaw of a hitherto unknown type of anthropoid ape should be washed into the same gravel-bed with a human skull of conformable size, and that both should become mineralized in the same manner and degree, may be regarded as extremely small.

6—More direct evidence that the lower jaw in spite of its apelike features is really that of a human being is furnished by the measurements given by Dr. Smith Woodward (*op. cit.*, p. 130). These measurements are on the whole nearer to those obtained from early human jaws than to those of full-grown apes.

7—The lower molars approach those of apes in their relative narrowness and in the large size of the third lower molar (as indicated by its alveolus), but in their flattened worn surfaces with very thick enamel they recall human rather than simian teeth.

8—The condyles, or articular surfaces, of the Piltdown jaw as compared with those of the great apes were more slender, less expanded transversely, and supported by more slender pillars of bone. In this feature the Piltdown jaw is more like the average human type, and this fact tends to remove the supposed difficulty in fitting this, in many ways apelike jaw on to a human glenoid, or upper jaw socket.

9—Doubts have also been expressed as to the association of the remarkably apelike canine with the other Piltdown

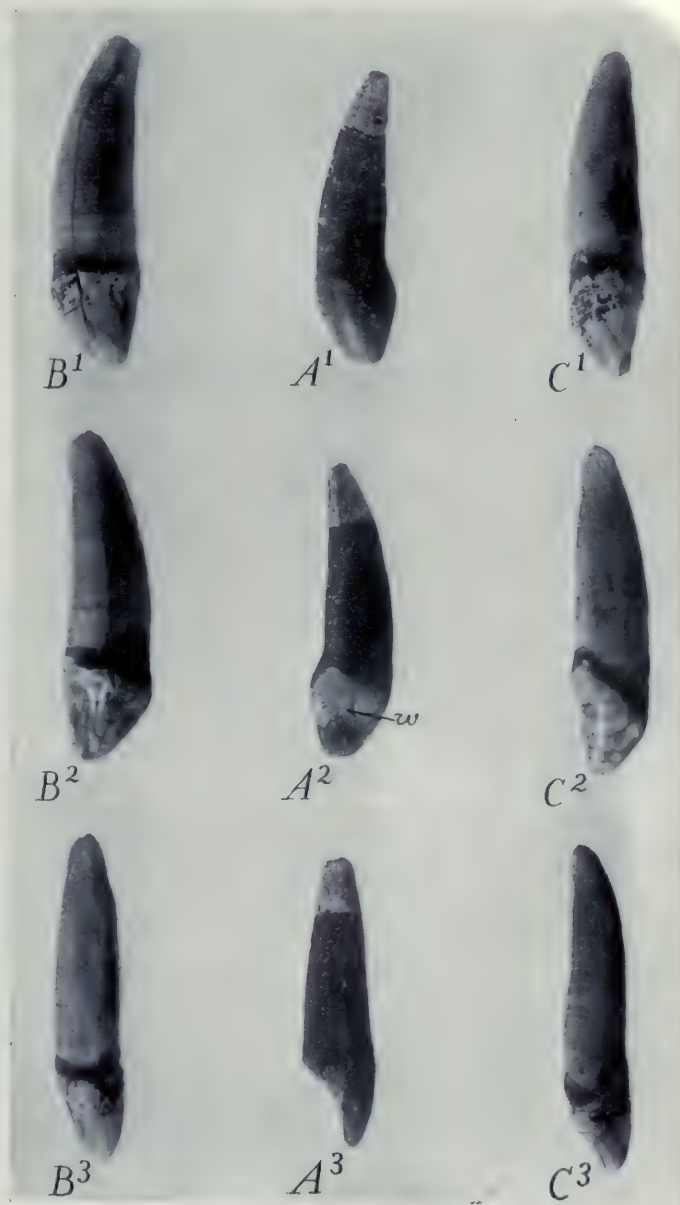


Fig. 6. Canine tooth (cast) of the Piltdown man (A) in comparison with the left upper (B) and right lower (C) canines of a female orang. Natural size. The lower canine is turned upside down to facilitate comparison with the others. In A the tip of the root is restored

A¹, B¹, C¹. Seen from the outer or labial side

A², B², C². Seen from the inner or lingual side. w, worn surface

A³, B³, C³. Seen from the front, or antero-internally

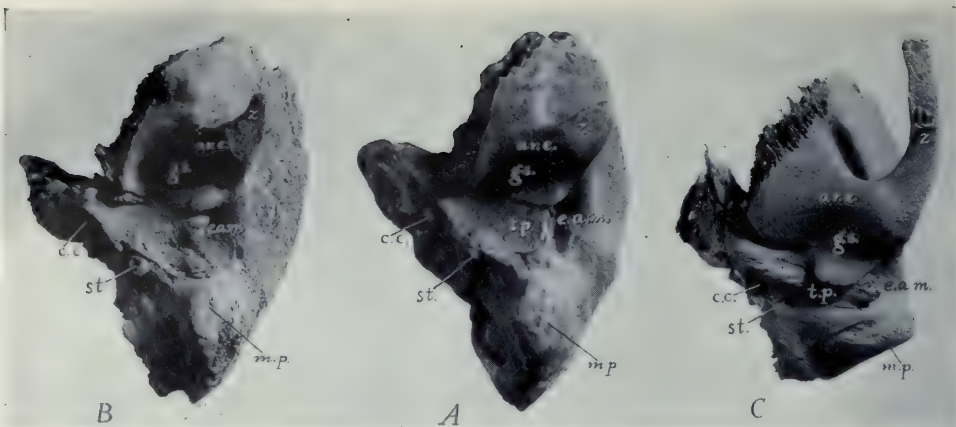


Fig. 7. Temporal bones of the Piltdown man (A), of a negro (B), and of a female orang-utan (C). Two-thirds natural size

ar. e., articular eminence (for lower jaw); c. c., carotid canal; e. a. m., opening leading to middle ear; g. s., glenoid socket (for lower jaw); pet., bone surrounding internal ear; st., pit for styloid process; t. p., tympanic plate; z, root of zygomatic arch

remains. The canine, which was discovered by Father Teilhard in the place where the other remains came from, was identified by Dr. Smith Woodward as belonging in the right side of the lower jaw; but as shown in figure 6, by comparison with the upper and lower canines of a female orang, its resemblances are on the whole closer to the left upper canine, as observed by Mr. A. E.

Anderson. If it be an upper canine its wearing surface is such that the first lower bicuspid which occluded with it must have been elongate and prominent and much more anthropoid than human in shape. Taken in connection with the total lack of a chin, and with the straightness of the molar tooth rows, this indicates that the lower part of the face and the dentition were even more apelike than in Dr. Smith Woodward's reconstruction. If the canine be an upper one, this would tend to confirm the association of the jaw with the skull, in the opinion of American Museum collectors.

While perhaps not conclusive the foregoing considerations tend strongly to show that all the Primate remains so far discovered at Piltdown belonged to one individual, which is represented by the greater portion of the brain-case, by the nasal bones, by the left upper

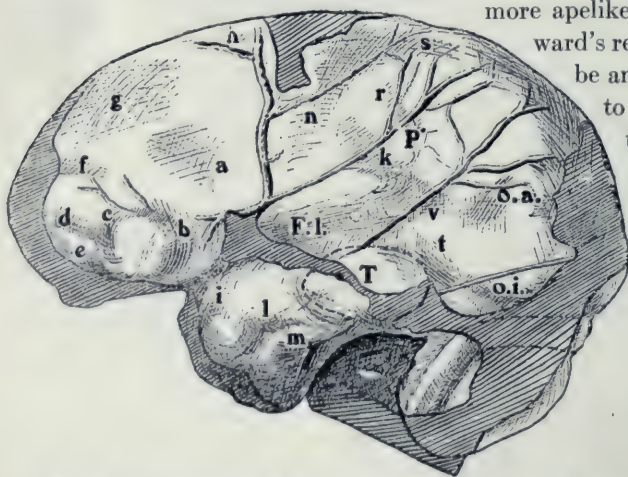


Fig. 8. Internal cast of the Piltdown skull. The fully shaded parts are represented in the original, the rest is restored. After Elliot Smith. The branching system represents the grooves for the meningeal arteries which are on the inner surface of the brain-case

canine tooth and by the imperfect right half of the lower jaw, the remaining pieces

presumably having been destroyed by the workmen in taking out the gravel.

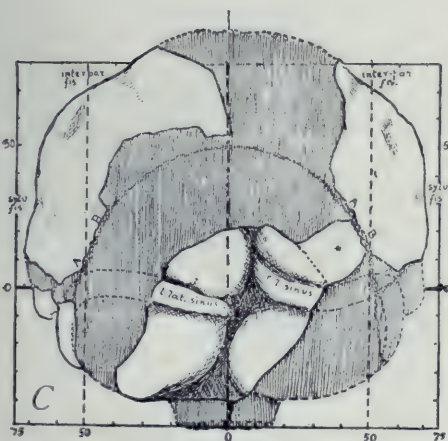
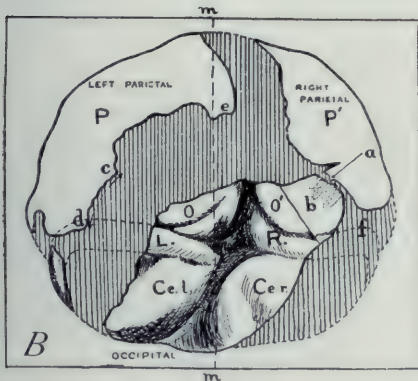
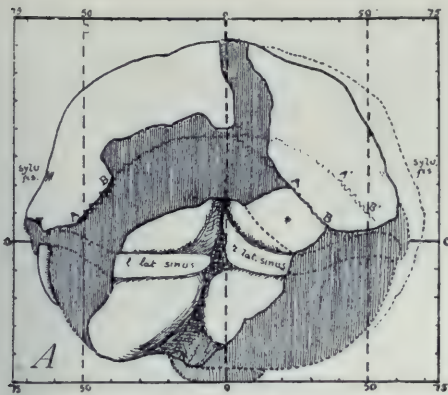


Fig. 9. Projections of the brain-case as seen from the rear, as reconstructed by Professors Smith Woodward (A), Elliot Smith (B), and Keith (C)

DID THE PILTDOWN MAN HAVE A VERY LARGE BRAIN CASE?

We come now to the most controversial part of the whole subject. Did the Piltdown man have a small brain-case as in Dr. Smith Woodward's reconstruction (Fig. 9 A), or a very large one as in Professor Keith's reconstruction (Fig. 9 C), or one of intermediate type as in the drawing published by Professor Elliot Smith (Fig. 9 B)? Unfortunately several pieces of critical importance are missing from the middle of the skull-top and this has made possible the markedly different results of Smith Woodward and Keith. For if the remaining pieces of the skull-top are placed close together as by Dr. Woodward, the brain will be a very small one, estimated at 1070 cubic centimeters capacity, while if these same pieces be tilted upward and moved further apart as by Professor Keith, the brain capacity will be as large as in many modern men, namely 1500 cubic centimeters. The subject is an exceedingly difficult one, as the writer has learned to his cost, after long efforts to assemble the casts of the separate pieces in their natural positions. It may be briefly stated that the writer inclines to the reconstruction offered by Dr. Elliot Smith (Fig. 9, C) which avoids the extreme asymmetry of the opposite halves of the brain-case noticeable in Dr. Woodward's reconstruction, and gives more space at the top for the ends of the meningeal vessels. Dr. Elliot Smith has also discovered certain marks on the inner surface of the frontal bone which appear to settle the vexed question of the location of the median plane.

THE PILTDOWN MAN AS ONE OF THE
"MISSING LINKS"

As stated above, the temporal bone and its mastoid process, the back of the head and the whole brain-case, as well as the brain cast, are human in character, although of low type, while the lower jaw and dentition are prevailingly simian. And while this regional distribution of human and simian characters was unexpected and in a way unprecedented, it means, as Professor Elliot Smith has noted, that the erect pose of the body, the freeing of the hands from locomotive functions, and the human development of the brain were associated in the Piltdown man

with a more conservative or simian structure of the dentition and jaw.

Whether or not the Piltdown man could talk is an open question. Dr. James Robinson has pointed out that in modern man the genioglossus muscle, the principal muscle of the tongue, is differentiated into many more or less separate strands, each with its own nerve supply and that this arrangement permits the extremely rapid and delicately coördinated movements of the tongue in speaking, whereas in the apes this muscle is much smaller and less differentiated. In modern man the muscle is attached to two little tubercles on the inner side of the chin, known as the genial tubercles (Fig. 6, *g. t.*). In the Piltdown



Fig. 10. A. Young chimpanzee skull
B. Piltdown skull
C. Adult male chimpanzee
D. The La-Chapelle-aux-Saints skull (Neanderthal race). After Smith Woodward

man, as in the apes, these tubercles are absent and the tongue rests below upon a shelf of bone. Nevertheless it may not therefore be assumed that the Piltdown man was entirely speechless. The brain cast shows in the temporal region (Fig. 8) an elliptical swelling (*T*) which foreshadows a certain greatly expanded center in the modern brain, a center "which recent clinical research leads us to associate with the power of spontaneous elaboration of speech and the ability to recall names" (Elliot Smith).

EVOLUTIONARY SIGNIFICANCE OF THE PILTDOWN RACE

Assuming that the jaw really belonged with the brain-case, Dr. Woodward very properly erected a new genus and species *Eoanthropus dawsoni* for the reception of this strange creature. He pointed out also that the rounded forehead with little or no brow ridges is characteristic of young apes (Fig. 10, *A*) while the flattened forehead with projecting brow ridges is characteristic of adult apes (Fig. 10, *C*) and also of the prehistoric Neanderthal race of man (Fig. 10, *D*); he therefore suggests that the still undiscovered mid-Tertiary apes which gave rise on the one hand to the various species of mankind and on the other to the existing anthropoids probably had rounded foreheads and a relatively short face.

Professor Keith's widely published but very questionable reconstruction showing the Piltdown man with a highly modernized brain-case has given opportunity to that part of the public which dislikes the idea of man's evolution from lower animals, to express the opinion that "the Darwinian theory is exploded." By palæontologists and comparative anatomists however, the evidence for man's cousinship with the

anthropoid apes is regarded as no longer an hypothesis but an established fact.

The proof of the ascent of man from certain still undiscovered mid-Tertiary primitive apes does not rest largely upon the scant fossil remains of extinct races of men and of apes. It does rest upon the convergence of many lines of evidence offered by the embryology, anatomy and fossil history of numerous races of animals. To mention only a single line of evidence, the adult anatomy of man and of the anthropoid apes is extraordinarily similar not only in general plan throughout, but in thousands of minute details in every part of the body. By a detailed comparison of the skulls of man, anthropoid apes, and Old World monkeys and other mammals one sees directly that the human skull is merely a special modification of the primitive anthropoid type, with the brain-case larger, the face shorter, the dentition weaker; but everywhere the fundamental architecture is the same. For example consider the region of the under side of the temporal bone in man and in the anthropoids (Fig. 7); here are precisely homologous parts throughout, the same processes and ridges, the same canal for the internal carotid artery, the same styloid pit for the attachment of the hyoid bone and so forth. And so it is everywhere, throughout the skull and the entire skeleton, throughout the marvelously intricate architecture of the brain, spinal cord, and musculature, in all the vascular, respiratory, digestive and reproductive organs; so that no matter how long one continues the comparison, new similarities are constantly being revealed.

Palæontologists and comparative anatomists likewise recognize and value the differences between men and apes. They realize that even the lowest existing races of mankind are extremely superior

to apes in mentality, in power of speech and in ability to use the hand as an organ of the will and intelligence. But they also believe that all these higher faculties, marvelous as they are, find their beginnings in the psychic and physical life of the apes, that the key to the mental and structural adaptations of mankind is to be found in the Primates alone among mammals.

Such being the general viewpoint of palæontologists and comparative anat-

mists, it need hardly be said that, to them, the Piltdown man, far from disproving the "Darwinian theory," is indeed a sort of "man in the making." He is one of the innumerable experiments made in Nature's vast laboratory, an early branch of the prehuman stock which had achieved a low human stage of brain and brain-case, but which in face and dentition still bore unmistakable traces of derivation from large-brained, primitive anthropoid apes.

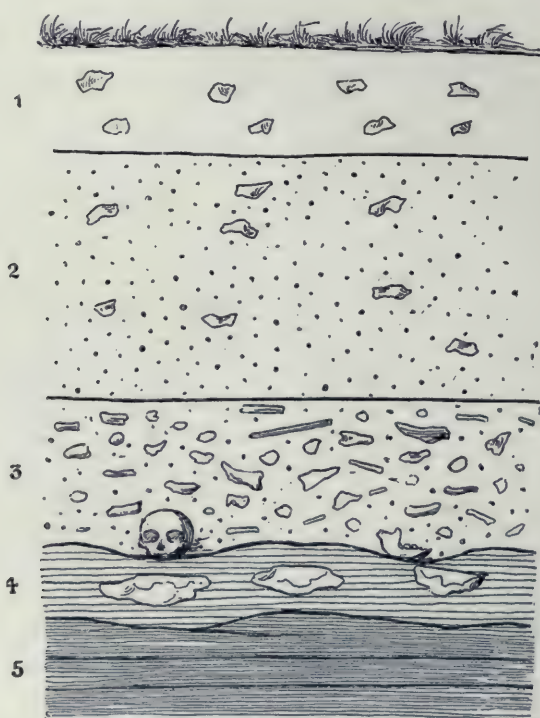


FIG. 11. Diagram of section of gravel-bed at Piltdown. After Dawson

1. Surface soil, with flints. Thickness = 1 foot
2. Pale-yellow sandy loam with gravel and flints. One Palæolithic worked flint was found in the middle of this bed. Thickness = 2 feet, 6 inches
3. Dark-brown gravel, with flints, Pliocene rolled fossils and *Eoanthropus* remains, beaver tooth, "eoliths" and one worked flint. 18 inches
4. Pale yellow clay and sand. 8 inches
5. Undisturbed strata of Wealden age

COPPER DEPOSITS IN ARIZONA

WITH A BRIEF HISTORY OF THE MINING OPERATIONS IN THAT REGION
AND SPECIAL REFERENCE TO THE COPPER QUEEN MINING COMPANY

By James Douglas

Dr. James Douglas of the Copper Queen Consolidated Mining Company, who has such large field knowledge regarding the copper deposits of Arizona is a great benefactor of the American Museum and has shown his interest in the institution not only in financing but also in providing data and giving personal supervision to the construction of the most elaborate mine model in any of the world's museums. This model has been completed recently after three years of work on the part of experts and is on exhibition in the hall of geology. The detailed description of the model, written by Dr. E. O. Hovey, has been necessarily deferred until the next issue of the JOURNAL.—THE EDITOR.

UP to the year 1845 the production of copper in the United States came from the Appalachian Range. Comparatively small quantities were mined in North Carolina, Virginia, and Vermont. Subsequent to that date the statistics of production illustrate the shifting of the geographical centers of most active mining. In 1856 Michigan's proportion stood at ninety-one per cent of the total; by 1869 it had risen to ninety-five per cent, but in 1882 it dropped to sixty-two per cent; and since then it has steadily declined until now it occupies third place in the country's list of producing states—the first being Arizona, with thirty-three per cent of the total, second Montana, with twenty-three per cent, and Michigan third, with twelve per cent.

The sudden decline in the preëminence of the Lake Region of Michigan marks the entrance of the Rocky Mountain Region into the arena of the copper industry through the building of the trans-continental railroads. It was not until the Union and Central Pacific gave an outlet to the Butte mines over a long wagon haul to Corinne and until the Southern Pacific had reached Benson, Arizona, that these two prominent regions appeared almost simultaneously in the *Statistical Tables* as producers. The

first furnaces erected in Butte, at the Williams branch of the Argo Smelting Works, were the first shippers of rich argentiferous copper matte and the commencement of the steady flow of copper by rail from Arizona was in the fall of 1880. Previous to that, as early as the sixties, copper ore had been shipped from the Planet Mines via the Colorado River to California, and thence reshipped to England; but years before the Southern Pacific had traversed the territory of Arizona, Captain Wade, well known more than half a century ago as an enterprising steamboat man on the Lakes, had organized the Detroit Copper Company in the Clifton District of Arizona, but death forestalled his mining operations.

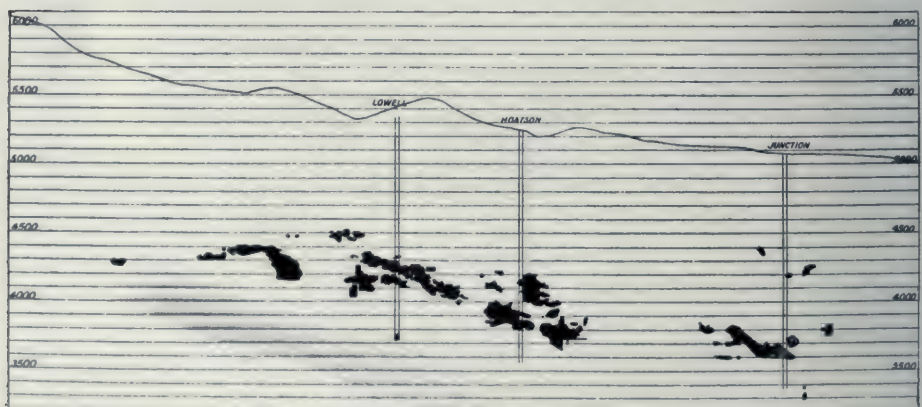
About the same time, in 1872, Messrs. Freudenthal and Leszynsky, a firm of merchants doing business on the Rio Grande, entered on a successful copper enterprise at Clifton under difficulties and dangers that would have deterred any but frontiersmen. The nearest railway station was about seven hundred miles distant in Kansas. Thither the bullion had to be transported by wagon, but as the smelters were also active importers, the bullion gave them return loads for some of their empty teams. Before 1874 they are reported to have

made eight hundred thousand pounds of copper, and even under such adverse conditions the annual output grew to a production of two million pounds in 1880. The mine which the Leszynskys attacked, was the Longfellow, yielding a very rich self-fluxing ore. The furnaces first erected were small reverberatories, built of brick, which are said to have cost a dollar apiece. These were abandoned and cupolas of the Mexican design were then erected, and the ore fused by charcoal hauled in from the Burro Mountains eighty miles distant. To increase the life of the furnaces metal plates lined the walls, and these were cooled with a spray of water. The next step was the erection of furnaces built entirely of large troughs cast from their own copper; and these primitive original prototypes of a water jacket were in use until 1883, when the Arizona Copper Company, a Scotch organization, acquired the Leszynsky plant and mines.

Meanwhile however, a much more important producer had sprung into existence. The Southern Pacific had reached Benson on the San Pedro River early in 1880. Sixty miles to the south-

east of Benson a claim called the "Halcro" had attracted attention by a large outcrop of oxidized copper, iron and manganese ore. It was relocated as the "Copper Queen," and had attracted the attention of several mining engineers. There was however an invincible dread in the minds of the profession against sporadic ore bodies in limestone, and the claim fell into the lap of an eastern lawyer and a western railroad man, who were encouraged to buy it for a trifle. They erected a small thirty-six inch water-jacketed furnace near the outcrop. Their adviser and first manager was Mr. Lewis Williams, a practical Welch smelter. No mining equipment was required for over a year, for the large outcrop of pure rich ore sufficed to feed the miniature smelting establishment with a furnace mixture netting over twenty per cent copper, and yielding from the start more than ten tons of copper bars per day. In 1881 a second furnace was added, and from this small plant thirty-four million pounds of copper were made from the first ore body prior to 1885.

Although the Queen Company was the



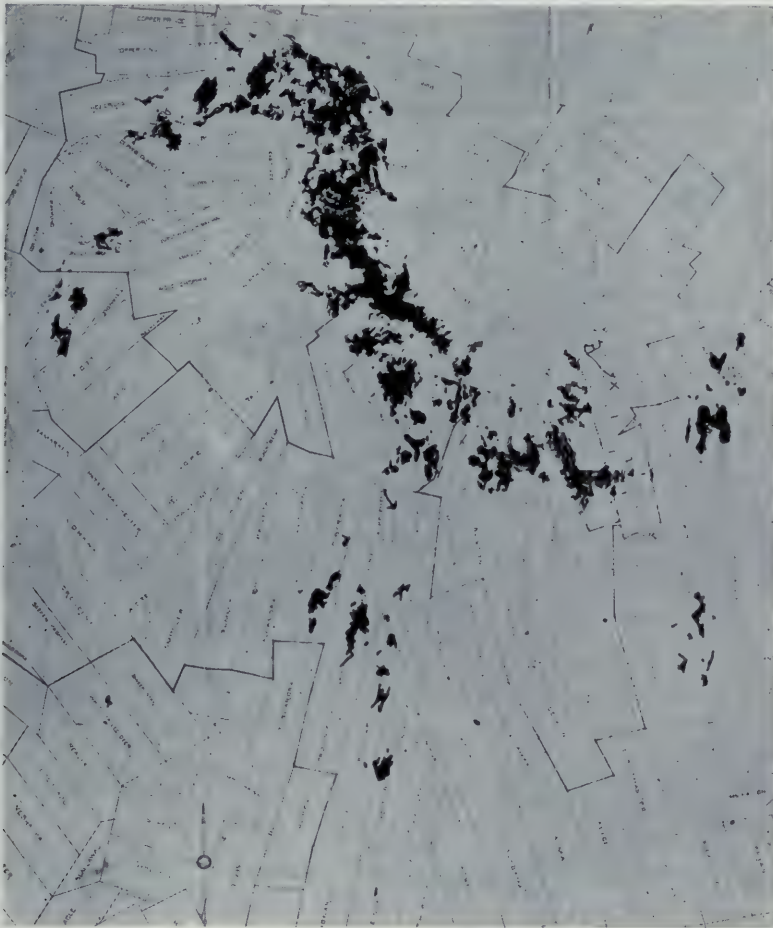
Section transversely across the southern portion of the Bisbee-Warren district, Arizona, showing the vertical distribution of some of the bodies of ore

The disposition of ore bodies of the Arizona district is erratic. After a permanency of several hundred feet a mine may suddenly end blindly in limestone and the cost of finding another ore body may be greater than the cost of mining it after found

largest producer in the territory, all the districts which have since been active began contributing their quota. We have referred to the early activities at Clifton.

The United Verdi deposits in northern Arizona had attracted attention before

even earlier than the Warren District; but neither Clifton nor Globe have been as prosperous as Bisbee, partly because of the highly silicious character of their ores. To render these ores fusible a large addition of fluxing material had to be added to the furnace charge, reducing



Map of claims showing the horizontal distribution of some of the proved bodies of ore. The Copper Queen Mine is represented in the upper left hand corner

actual mining was commenced at Bisbee. Ever since their development they have yielded an ore of exceptionally favorable smelting composition and richness. Another district, that of Globe, which is still prominent as a producer, had been discovered and superficially explored

proportionately the percentage of copper and involving a heavy loss of copper in the slags. Moreover, the Globe ores continue to be still deficient in sulphur, an element essential to economical smelting. On the other hand Bisbee had the advantage over its rivals in the South, of

a diversity of ores from which a favorable furnace mixture could always be made, and when matte smelting, with its cleaner slags and purer copper was introduced, Bisbee found itself with an unlimited supply of sulphur. At one time — but it was of short duration — Globe and Clifton could mine a richer grade of ore than Bisbee, which now enjoys the possession of a fusible ore of an average high grade of between five and six per cent.

The first period of the prosperity of the Copper Queen terminated abruptly in 1884, with the exhaustion of the first large ore body. Its apparent isolation after maintaining such permanency for four hundred feet, and its sudden termination in limestone, leaving no apparent clue to guide in the search for another ore body, was the first warning we had of the eccentric deposition of these copper deposits in their limestone nidus. They are confined to a series of about four hundred feet in thickness of the lower Carboniferous series and upper Devonian series, but owing to their erratic distribution, the cost of finding them often exceeds the cost of the actual extraction of the ore when found. By following certain trails blazed by the geologists along fault planes, exploration is now conducted with more certainty than formerly, but the horizontal maps of the ore bodies, as yet discovered, exhibit to the eye of the uninitiated that the search for ore bodies in this district is a more capricious task than in most mines.

Within these beds of ore-bearing limestone, decay has reached to a great depth. They have been partially explored for ore, by the Copper Queen and the Calumet and Arizona Mining Companies on their dip for a distance of a mile and a half from their outcrop; and at a vertical depth of eighteen hundred feet

from the surface, the ores are completely or partially oxidized, and the limestone and the intrusive porphyrites in which they occur are extensively decayed. Masses of unaltered pyritic ore are encountered in the Devonian and Silurian limestone, which underlie the Carboniferous, but those as yet discovered have not been large. It is estimated that in searching for ore and the development of known ore bodies, there have been driven by the Copper Queen Company two hundred and thirty-five miles of horizontal and vertical drifts and raises.

The disposition of the ore bodies being so erratic, more than the usual mining risks have occurred. At one time the fate of the district was in the balance. The summer after Queen commenced operations, Messrs. James and Dodge bought the Atlanta claim, which was parallel to the Copper Queen, and toward which the ore body of the Copper Queen was dipping. Four years were expended in drifting, running tunnels and following stringers of ore from the surface, which ended in nothing. Meanwhile the Copper Queen ore body had ended abruptly, before reaching the Atlanta side line. The only other company, the Neptune, had exhausted both its capital and credit, and had abandoned work; and therefore, for a period dark clouds of despondency overhung the district.

But almost simultaneously, after the Copper Queen had driven an exploratory drift in barren limestone for five hundred feet, and the Atlanta Mining Company after four years of disappointment was in despair, both companies struck the same new ore body. Instead of quarreling as to ownership, under the law of the apex, they decided to unite. The Atlanta Mining Company merged itself into the Copper Queen, reappearing in

the word "Consolidated." In fact however the Copper Queen proved to have been worked out, and the Atlanta alone supplied the ore for years which restored the Consolidated Company to prosperity and fame.

The copper industry was passing through the most trying period of its existence. The price of standard copper bars (of ninety-six per cent) had dropped from eighteen cents to a trifle under eight cents per pound, Lake copper standing as low as ten cents. Dividends failed to be paid during 1885, 1886 and 1887, the only blanks in the dividend record of the Company. To make cheaper copper, better appliances had to be introduced. A new smelter was erected and despite low prices, a fraction of a cent per pound was made—when M. Sacrétan unintentionally sacrificed himself and his bank for the good of the copper world. After that, as years rolled by, the Company acquired adjacent property and enlarged the capacity of its furnaces. Meanwhile the character of the ores changed in depth. The presence of sulphur in the furnace charge resulted in the production of matte, as well as copper. This involved a radical alteration in the metallurgical methods and the design of the smelter. Bessemer converters were added to the plant. Although the conversion of all the copper into matte involved a slight extra smelting cost, by making cleaner slags a saving of more than one per cent in the furnace returns was made. Moreover the bars produced carried ninety-nine per cent of copper and over, instead of ninety-six per cent.

As a result of the greater purity of the bars, the cost of refining by electrolysis was reduced to a figure that made it profitable to pay the refiner the slight excess over the old furnace method and

recover the precious metals. Since 1896 all the copper has been refined electrolytically, and has saved seventy or eighty cents in gold and silver per ton of ore. It is a trifle per ton, but amounts at present to an aggregate of \$865,000 per annum from the Company's ores alone.

The second works, erected in the cramped valley around which the town of Bisbee had grown up, could not be expanded to meet the growth of the Company's production, and therefore toward the close of the century, it was recognized that a new smelter in a new locality must be built.

As early as 1887 a railroad of thirty-nine miles was built by the Company to connect with the Santa Fé Railroad's Sonora System at Fairbanks. Its tracks were extended for twenty-eight miles easterly to Douglas, a junction point of a Mexican railroad built to meet the requirements of a mineral region which had been developed at Nacozari, seventy miles south of the international boundary line. At this junction point in the Sulphur Spring Valley, suitable sites were selected for two smelting plants of large size, which were planned by the Copper Queen Company and the Calumet and Arizona Mining Company. This latter vigorous organization had entered the district in 1898, and has aided in the development of its resources. The two mining companies agreed to coöperate rather than to litigate, and the method has so far worked successfully.

The large reduction works at Douglas, Arizona, were planned to smelt in cupola furnaces about fifteen hundred tons of ore per day. But they have grown in size and in complexity of methods, until now there are treated daily twenty-five hundred tons of ore in the cupolas and

five hundred tons of concentrates from Nacozari and flue dust in reverberatories.

A table of production and of dividends gives in brief the history of the enterprise's success since its organization.

COPPER QUEEN CONSOLIDATED MINING CO., FROM THE YEAR 1887

COPPER QUEEN MINING CO., PREVIOUS TO 1887

YEAR	MINING CLAIMS ACQUIRED.		Lbs. Copper Produced	DIVIDENDS PAID Amount	REMARKS
	Claims	Acres			
1881	2	26.08	34,536,000	1,350,000	Under Messrs. Martin & Ballard and original Copper Queen Mining Co.
1882	—	—			
1883	—	—			
1884	1	0.473	6,721,535	—	Under Copper Queen Consolidated Mining Co. Developing mines and rebuilding smelting works
1885	3	37.99			
1886	—	—			
1887	16	188.734	5,945,550	—	Enlarged smelting works and better prices paid for copper by M. Secrétan during 1888 and 1889
1888	5	59.107	9,379,949	140,000	
1889	1	10.77	9,408,000	105,000	
1890	1	11.56	9,031,680	210,000	Large accessions of property by acquiring the Holbrook & Cave Co.'s mine, the Neptune Co., and other claims. The Bisbee smelter was enlarged to an extent limited by the size of the site on which the works were located up to the date of their removal from Bisbee to Douglas.
1891	3	23.19	10,203,683	420,000	
1892	28	234.353	9,806,764	385,000	
1893	6	55.685	13,795,618	300,000	The production of the Douglas smelter
1894	—	—	12,688,372	200,000	
1895	—	—	15,741,731	250,000	
1896	—	—	23,298,150	400,000	
1897	—	—	23,999,873	700,000	
1898	2	0.708	33,749,390	1,000,000	
1899	2	0.872	36,901,684	2,000,000	
1900	6	54.722	34,382,309	2,800,000	
1901	35	430.485	39,781,333	3,150,000	
1902	10	196.21	35,831,755	800,000	
1903	7	120.168	36,939,800	800,000	
1904	—	—	61,225,522	800,000	
1905	—	—	76,791,981	2,300,000	
1906	—	—	79,807,461	6,500,000	
1907	—	—	62,502,961	3,800,000	
1908	—	—	81,986,236	3,000,000	
1909	—	—	75,869,405	4,025,000	
1910	—	—	71,928,357	6,300,000	
1911	45	727.494	75,203,813	5,200,000	

ANCIENT POTTERY FROM NASCA, PERU

By Charles W. Mead

The Nasca Collection of pottery, featherwork, textiles and other objects has been purchased and presented to the Museum by Mr. A. D. Juilliard

THE Museum has recently had the rare good fortune to secure in a collection from prehistoric graves in Nasca, Peru, some four hundred and twelve examples of pottery. Nazca pottery is undoubtedly the most beautiful ware so far discovered in South America, which is saying much in view of the thousands of remarkable pieces that have been brought to light in various localities, especially along the Peruvian coast and in the high plateau region about Lake Titicaca. The pottery from Nasca is a thin ware showing a high degree of skill in the firing, but its claim to preëminence lies in the beauty of its painted decorations. The designs are mostly derived from the same motives as those found on Pachacamac pottery of the so-called "Tiahuanaco" style, but are much more highly elaborated. Many different colors and tints are employed, and the color schemes are worked out in a truly artistic manner.

The credit of bringing this unique pottery to light is due to Dr. Max Uhle. In a short account of his discovery of the Necropolis of Nasca in 1901 (*Proceedings Davenport [Iowa] Academy of Sciences*, vol. xiii, 1-46) he tells us that he had previously seen in the Berlin *Museum für Völkerkunde* a group of four polychrome vessels of an unknown type. They had come into the possession of the Museum in the seventies, labeled as coming from Ica and Chala. Nothing resembling them had been seen and as the region around these localities was unknown to archæologists, but little importance was

attached to the original labels. Dr. Uhle says, "I still recollect the enthusiasm with which the late Adolf Bastian, the founder of the *Museum für Völkerkunde*, extolled these few strange and wonderful objects, the like of which never had been seen before as coming from Peru."

Dr. Uhle states that it was largely owing to the inspiration of Professor Bastian that he "determined to study the question as to the provenience and cultural significance of this type of polychrome ware," of which he had seen these few specimens in Berlin.

The second Hearst expedition to Peru, under the auspices of the University of California, furnished Dr. Uhle the desired opportunity of searching for the mysterious hiding place. He arrived in the department of Ica in November, 1900, and having purchased riding mules, immediately set out on his quest.

It was in the month of January, 1901, while visiting at the hacienda Ocucaje, twenty-five miles south of Ica, that he realized the object of his search; but let him give an account of his discovery in his own words. He says, "After having made a number of minor excavations with the same negative results as all the former attempts, I was riding one day around a sandy edge of the valley when my eye was arrested by a simple potsherd lying upon the ground. It proved to be a fragment of a large bowl, quite undecorated but for a band of red coloring along the upper rim. My attention was thereby roused at once. Only

in objects of the Tiahuanaco period had I so far found this characteristic feature. I decided to dig in this place. Quickly the necessary workmen were brought together and a donkey was set to work to carry all day long the supply of drinking water from a spot three miles away where water was to be found in the river bed at about three feet below ground. The first day's work proved that the long sought cemetery had, at last, been found and that the beautiful polychrome ware had been located."

Archæologists recognize four principal types in the immense variety of prehistoric Peruvian pottery: that of Tiahuanaco; the Inca type on the shores of Lake Titicaca, with its classical forms; that of the region of Trujillo, and the Nasca style with its polychrome decorations. These four different types would seem to mark periods of the highest cultural development in Peru in prehistoric times.

What has ever been a mystery in the study of the archæology of southern Peru is the fact that so many of the seats of culture are found to be in arid valleys where there is little or no running water, surrounded by extensive deserts. In many such situations there must have been a dense population as evinced by the vast cemeteries. There do not seem to be any known facts to support the theory that the climate has undergone any great change. Why were such localities selected and how was it possible that means of support could be found for a large body of people under such unfavorable conditions? Although the vicinity of Nasca does not appear to have been one of the densely populated districts, the

conditions were the same as others just described.

Nasca lies about two hundred and twenty miles to the south of Lima and fifty miles inland from the Pacific coast. The region is extremely hot and dry, and the soil is mostly sand strongly impregnated with nitre. About the only native forms of vegetation to be seen are algaroba trees and the indigenous cotton bush.

The graves are usually from six to ten feet deep in the sand. The body, clothed in a poncho and wrapped about with various pieces of cloth, was placed in a sitting posture. Commonly two or more vessels of this beautiful polychrome ware, and various articles that had belonged to the deceased, were placed beside the body in the grave; sticks of algaroba wood were laid over the "mummy," and the pit filled in with sand. Infants were buried in large earthen jars. Objects of gold have been found in these graves, but up to the present time no implements of copper or bronze have been discovered.

The colors used in decorating Nasca pottery were white, yellowish white, yellow, red, orange red, pink, deep red, brown, light blue, blue, violet, gray and black. As in other parts of Peru, the decorative motives are largely drawn from the human figure, birds, fish, the great cats, mythological monsters which are usually a combination of human and animal figures, and geometrical designs derived from the textile art. The accompanying illustrations show forms and decorative designs, but of course give no idea of the colors which are the chief charm of these ancient water vessels.



Presented to the Museum by A. D. Juilliard

NASCA POTTERY

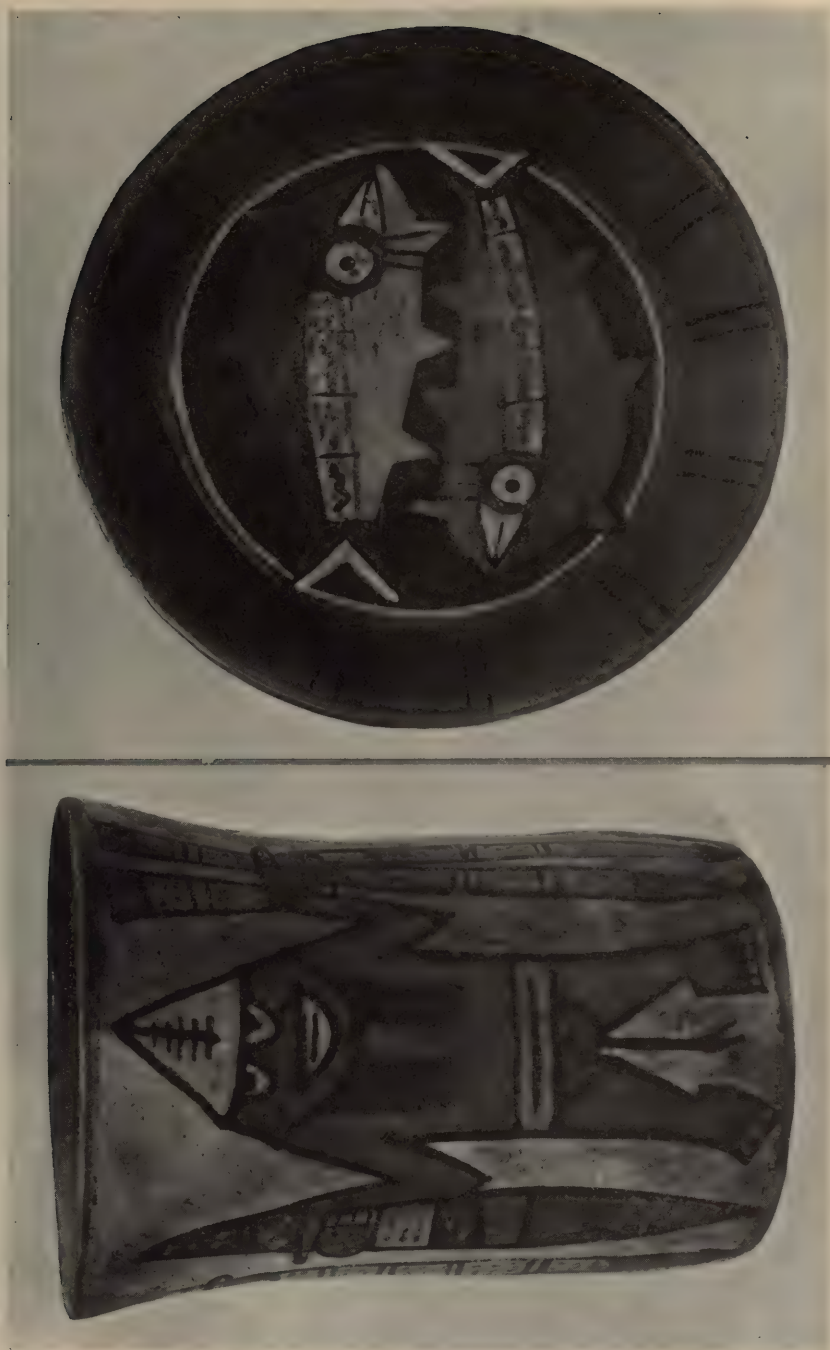
The Nasca pottery vessels (some 412 in number) discovered in prehistoric graves, is the most beautiful in color and decorative design of any yet found in South America. Figure 1 shows highly conventionalized humming birds extracting honey from starlike flowers. Figure 2 is a vessel with a mythological figure wearing a face mask



Presented to the Museum by A. D. Juilliard

EXAMPLES OF NASCA POTTERY

Figure 1 shows a bird resting on a gourd vessel. Figure 2 is a drinking cup with representation of a warrior carrying darts and a feathered staff; below are two rows of human faces with facial decoration



Presented to the Museum by A. D. Juilliard

NASCA POTTERY VESSELS

Figure 1 is a vessel of relatively crude design. It shows a warrior wearing a curious laced cap and a breechcloth with string and tassel hanging from the back. Figure 2 shows a saucer-shaped vessel, decorated inside with figures of two horse-mackerel.



Presented to the Museum by A. D. Juilliard

TWO INTERESTING PIECES OF NASCA POTTERY

The first shows a seated figure holding some kind of vegetable or fruit in each hand. A white band extends from the mouth to the bottom of the vessel and upon this are painted numerous representations of the crawfish and herring. This piece of pottery is especially beautiful in coloring. Figure 2 has a representation on the upper surface of a person holding sprigs of a plant, probably the sacred coca leaves

THE CROCKER LAND EXPEDITION

LETTERS arrived late in May from various members of the Crocker Land expedition, brought to civilization by Knud Rasmussen, the Danish explorer. The Crocker Land expedition under the leadership of Donald B. MacMillan left New York on July 2 for three years of exploration work over the ice cap of Greenland and northwest from Cape Thomas Hubbard to investigate the land which Peary reported that he saw over the sea ice and named Crocker Land. Until these letters came, the Museum had received no word from the expedition since a report sent to New York on August 30, 1913, when the expedition was making preparations to winter at Etah, the site of Peary's former camp. In fact considerable disappointment has been felt at not receiving frequent news as the expedition carried wireless and there had been hope of continual communication. It now appears that the lack of result with wireless has been due probably to two reasons: that the location of the expedition's winter quarters at Etah has been unsuitable to give a proper lead for their aerial and that the instruments carried are not of sufficient power without the intermediate station at Cape Wolstenholme, Hudson Bay, which was to be established by the Canadian government.

When the letters were written the expedition's difficult work had not yet been undertaken. The men had been snugly ensconced at Etah in a commodious well-heated house constructed of lumber carried for the purpose. The house is equipped with electric lights within and without. There had been plenty of the food of civilization. With youth, health and what had proved congenial comradeship, they had worked in and about this "palace," as they

named it, making only relatively short excursions to hunt and to cache supplies at Anoritok twenty-five miles north and at the entrance of Buchanan Bay across Smith Sound on Ellesmere Land, although Ekblaw had made the longer journey to Cape Melville to view a meteorite purchased by Rasmussen from the Eskimo. Their letters are filled with enthusiasm for the four hundred-mile journey planned for the spring over Ellesmere Land and Grant Land and an additional one hundred and twenty-five miles of sea ice to the new land. The following quotations give somewhat the story of the months since they reached Etah:

EXTRACTS FROM LETTER FROM DONALD B. MACMILLAN, LEADER OF THE EXPEDITION, TO HENRY FAIRFIELD OSBORN, PRESIDENT OF THE AMERICAN MUSEUM, WRITTEN AT ETAH, NORTH GREENLAND, JANUARY 10, 1914

The midnight of the long Arctic night is over with every one in good health and eager for the big work ahead of us. Apparently the darkness and absence of the sun has had no effect at all upon the boys; they are just as happy as ever and singing most of the time. Ekblaw is now on a trip with dog team to the shores of Melville Bay to obtain if possible a piece of a large meteorite found by Koodlooktoo. We should make every effort to secure all of it if the Eskimo boy had not sold it to the Danes. It is undoubtedly part of the same fall from which came "Ahnighito" and the others secured by Peary in 1896 and 1897....

The day after the ship left us we began excavating with picks and dynamite for our house, selecting a well sheltered spot in the midst of the Eskimo igloos. The work went on day and night and on

September 12 we moved into a large, comfortable home 34 by 34, eight rooms on the ground floor and a large attic for a store room. To this we added as a protection from the cold and for quarters for our dog-drivers a shed eight feet wide on two sides. I am quite sure we have the most palatial residence ever put up in the Arctic with our electric lights and with telephone to two Eskimo igloos. We have tried to make the boys just as comfortable as possible as an inducement to good work, giving them good warm rooms and good warm clothing.

...I have succeeded in establishing two provision stations on the line of march to Crocker Land, one at Anoritok, about twenty-five miles north of here and the other across Smith Sound over in Ellesmere Land at the entrance of Buchanan Bay. The boys crossed over last month by moonlight getting five polar bears on the way. This moon our dog-drivers are all hunting walrus, hoping to give our dogs plenty of meat so as to keep them strong for the hard work to come.

...We have over a thousand miles to go in a temperature ranging from thirty degrees to seventy degrees below, and such an undertaking cannot be accomplished without hardship and suffering and loss of dogs. The evil spirit of the Arctic is always watching and can change success into misfortune and failure within a few hours. One month ago the boys with their dog-drivers had no trouble at all in getting to Anoritok. This month when the ice conditions should be better we were blocked by open water almost within sight of the house. Such is the uncertainty of one's work here.

When we left home Allen and Green were quite sure that we should be able to communicate with you by wireless whenever we liked. They have tried,

have worked like Trojans, have listened attentively but not a tick or a buzz have we heard, which is a great disappointment to the Museum and our friends. In the spring we shall try kites to support the aerial and keep trying as long as we are here, hoping that conditions may be right at some time to catch us.

We shall leave the house here for Crocker Land about February 10 with twenty-one men and one hundred and sixty dogs and shall remain on the other side just as long as we possibly can. If cut off by open water in Smith Sound we can easily subsist on game found in the region, crossing over when ice forms late in the fall.

EXTRACTS FROM LETTERS FROM FITZHUGH GREEN TO HIS FATHER AND MOTHER DATED JANUARY 11 and 24, 1914, WRITTEN AT ETAH, NORTH GREENLAND

Our plans for the spring trip are complete. I leave two weeks from to-day, when the moon is up and increasing daylight permits traveling...

The white men do not travel together. We cannot take tents and shall depend on the natives for our snow shelters. We are taking tea, biscuit and pemmican for eighty days but do not expect to be back until June, depending on game for food later...We can take only the clothes in which we walk, spare foot gear, an extra shirt and a sleeping bag.

I know that you care not the snap of your fingers whether we find Crocker Land or not. I realize that I must come back to you. But even that cannot change the everlasting desire inside of me, the passion to travel, to fight the cold, and the wind and the nights, to be hungry and kill game. Unless the Devil himself gets into my luck and lays me up early with a frozen foot or the like

I am going to have the time of my life on that trip. The only thing that can prevent it will be the tender bringing up I had in the South, which the Eskimo had the luck to miss.

Just now the wind is trying to blow the house down. That seems to be the daily task it sets itself, but it only makes the stove draw better.

The hills are silent, there is no answer to my footstep from the great white plains. I walk and walk! Cold? No! the thermometer says it is bitter cold but the glass tube is a plaything of the South — it lies! My hands are bare — from one dangles my mittens wet with sweat, in the other is my whip with which I clip little dents in the snow around me. The whip is about twenty-five feet long and it cracks like a pistol in the crisp air. Over my head circles a great round moon, brighter than any you ever saw. Round and round she goes, rolling lazily along; underfoot the road is miles wide and leagues long, whiter than the whitest marble it stretches away into the dreams that come. I seem to weigh nothing; my muscles are steel springs; I laugh aloud! I throw back the hood of my *koolitah* — its fox tail roll keeps my face warm but I tire of it. I listen, not a breath — not a movement in the miles and miles that lie before my eyes. Even the mist over the ice cap hangs sleeping on the white breast beneath.

... Last month Ekblaw and I laid our food supplies up to the coast and over in Ellesmere Land for the spring trip that starts in February, as soon as it gets light enough to travel in the day time. We each had our divisions of Eskimo but kept in touch with each other. On the last trip that ended just before Christmas we got five bears. I shot one of them. Now I have bearskin pants, mittens, and trimmings of bearskin on all of my fur clothes.

We had temperature below 50° below zero and had a bad gale with the bitter weather. Even the Eskimo frosted their faces. But I have become so used to freezing my face that it is no more than sunburn at home.... We got all turned around and were traveling in the night and sleeping in the daytime by the time we reached home. I could write all night about things but will tell you some day. All I have to say is that I hope the ship gets wrecked on her way up to take us back so that we can stay another year. I guess the Lord made me an Eskimo and then forgot and sent me to you instead of to Panikpah or the like.

The Eskimo are an ideal crowd. They are good-natured, unselfish and everlastingly good fun. The children have white children beaten a mile. I have a regular nursery in my room and never feel at home unless I stumble over two or three when I am trying to find my clothes or writing material.

EXTRACTS FROM LETTER WRITTEN JANUARY 9
AT ETAH BY DR. HARRISON J. HUNT

Last moon I went to North Star Bay to see some sick people, and visited all the Eskimo settlements on the way home. They are eager to go with us. This tribe needs a doctor to reside with them. A small lying-in hospital would increase the population at once as the death rate among infants and mothers is very high. With about forty thousand dollars behind me I would like to undertake the task.

The colony at Etah shot about fifty caribou this fall. Seals are plenty and large Arctic rabbits, one of which I shot to-day weighing nine pounds, and there are bear and fox, to say nothing of the ducks of which we have eaten a great many.

... The Eskimo are with us all the time,

make our skin clothes and eat our food in return. They are a clean lot and as honest as the day is long. Nothing is ever taken although things are left about under their noses all the time....

EXTRACTS FROM LETTER WRITTEN BY W. ELMER EKBLAW, NORTH STAR BAY, NORTH GREENLAND, JANUARY 16, 1914

...I am writing this letter at the polar cabin of Herr Knud Rasmussen at this place, on my return trip from Cape Melville whither I went with him to examine a great meteorite near there. He has purchased it from Koodlooktoo, the Eskimo who found it for the museum of the University of Copenhagen. I am making as careful a report as my facilities permit to be sent to the king of Denmark, secure in the conviction that you will fully approve my thus taking upon myself the responsibility for an action which I deem but an international courtesy and scientific duty....

We are all in good health, quite enthusiastic despite our failure to get the wireless messages through, and except for the fact that our dogs are not in condition, well ready for the coming dash to Crocker Land....

My 300-mile journey to Cape Melville and return during this midwinter moon has been fraught with much adventure, much interesting and novel experience, and all the scientific observation I could make by moonlight and the waxing mid-day twilight. It is a journey I should like very much to make by daylight, for the geological phenomena of interest to science are numerous and varied and would richly reward the investigator. I wish I might stay here five years instead of three, for even so, I should be busy every possible moment on the problems I have already encountered. There is great work to be done here by some

enthusiast, particularly in geology and botany. I feel sure that in the Pre-Cambrian formations and in the glacial phenomena, results could be obtained that would throw much light on the geology of all North America....

Herr Knud Rasmussen has shown me every courtesy. I feel he is a man worthy of your personal attention to which I commend him should he ever come to New York. He is a gentleman, a capable and trained explorer and a carefully educated ethnologist.

LETTER WRITTEN BY DONALD B. MACMILLAN
AT ETAH, JANUARY 21, 1914

Ekblaw is just in from Melville Bay... Rasmussen is most kind and offers to help us in every way possible. He had plans for an attack on Crocker Land this year but most generously gave them up when he read of our intentions.

We have only three weeks now before leaving on the long trip. Eighteen sledges will leave here from February 7 to 9 loaded with about 9000 pounds of food and equipment. Four sledges will probably return from the head of Beitstad Fiord; others will go on to Cape Thomas Hubbard. From here I am planning to send Dr. Hunt south to run in unexplored coastline and Tanquary north. Ekblaw, Green and myself with eight Eskimo will head out northwest over the Polar Sea. When leaving Etah we shall have food for eighty days. This, I hope, will put us on the shores of Crocker Land and back to Cape Thomas Hubbard. For the 300-mile trip home we shall depend upon the game of the country, remaining in Ellesmere Land just as long as we possibly can.... Naturally I am very much disappointed over the failure of our wireless. Possibly the big station in Hudson Bay has not been installed so you may hear from us yet.

MUSEUM NOTES

SINCE the last issue of the JOURNAL the following persons have become members of the Museum:

Founder, Hon. Joseph H. Choate;

Associate Founders, MESSRS. CLEVELAND H. DODGE, ARCHER M. HUNTINGTON, ARTHUR CURTISS JAMES, CHARLES LANIER, OGDEN MILLS, PERCY R. PYNE and WILLIAM ROCKEFELLER;

Life Members, MRS. ROBERT STEWART, MISS KATHARINE DUBOIS and MR. J. K. ROBINSON;

Sustaining Member, MRS. ROBERT STEWART;

Annual Members, MRS. FRANCIS C. BARLOW, MRS. H. B. GOLDSMITH, MRS. J. M. HUBER, MRS. EUGENE LEWIS, MRS. THOMAS P. MCKENNA, DR. ROBERT ABBE, PROF. WESLEY C. MITCHELL, REV. J. FREDERICK TALCOTT and MESSRS. SAMUEL FRANK, MOE JACOB, WILLIAM KRONE, WILLIAM SIEGEL, DAVID SHEARMAN TABER, JR., FERDINAND WEBER and JOSEPH WITTMANN.

THE zoölogical collections which, through the generosity of Colonel Roosevelt, the Museum has received from the Roosevelt expedition to South America, amount to twenty-five hundred birds and four hundred and fifty mammals.

Work was begun by George K. Cherrie and Leo E. Miller, whom Colonel Roosevelt took with him as representatives of the Museum, in the vicinity of Asuncion, Paraguay, in the early part of November. The next collecting station was in the vicinity of Curumbá. From this point, the expedition proceeded northward through San Luiz de Cáceres to Utiarity and Tapirapoan.

At Utiarity Mr. Anthony Fiala, "chief of commissary," started with Lieutenant Lauriodo Sta. Anna, and six natives, down the Papagaio, Juruena and Tapajoz Rivers at Santarem. The expedition continued its five-hundred-mile overland ride to the Rio da Dúvida. From here Mr. Miller with Second Lieutenant Joaquim Manuel Vieira de Mello, Euzebio Paulo de Oliveira, and Heinrich Reinisch, representatives of the Brazilian Government, went overland three days, then down the Gy Paraná and Madeira Rivers and up the Negro to Manaus.

On February 27, the main party, consisting of Colonel Roosevelt, Colonel Rondon,

Lieutenant Lyra and Doctor Cajazeira, of the Brazilian Army, Kermit Roosevelt, George K. Cherrie and fifteen canoemen, started on what proved to be a perilous voyage down the hitherto unexplored Rio da Dúvida, which was ascertained to flow into the Madeira. The difficulties of transportation were so great that comparatively few specimens were collected by Mr. Cherrie on this trip. Those which he did obtain, however, proved to be of exceptional interest.

Mr. Miller made an important addition to the collection at Calama, at the junction of the Gy Paraná and Madeira, and also at Manaus, which he reached several weeks in advance of Colonel Roosevelt's party.

THE Library has just received as a gift from Mr. Anson W. Hard a number of rare and valuable works. *Die Infusionsthierchen als vollkommene Organismen und Mikrogeologie* by D. C. G. Ehrenberg, who made the first serious investigations of micro-organisms by the aid of the microscope, are noteworthy additions to the Library. *Trees of Great Britain and Ireland* by Henry John Elwes, privately printed in seven volumes with magnificent plates, will be appreciated by all tree lovers and students of forestry. Of hardly less note are *Delectus animalium articulatorum* by Spix and Martius, *Voyage pittoresque et historique au Brésil* by J. B. Debret and *Voyage to New Guinea and the Moluccas from Balam-bangan* by Thomas Forrest.

At a recent meeting of the Board of Trustees the constitution of the Museum was amended so that the incorporators of the institution should be designated as Founders of the Museum, and was further amended to create a class of members to be designated as Associate Founders. All persons contributing \$25,000 in cash, securities or property to the funds of the Museum are eligible for election to this class.

THE Academy of Natural Science of Philadelphia has conferred the Hayden Memorial Medal for the year 1914 upon Professor Henry Fairfield Osborn in recognition of his contributions to the science of vertebrate palæontology.

COLONEL THEODORE ROOSEVELT has arranged to give to members of the American



Members of the Roosevelt expedition to South America. At the left of Theodore Roosevelt, Father Zahm, George K. Cherrie, representative of the American Museum and Anthony Fiala, chief of commissary; at the right, Kermit Roosevelt, Frank Harper and Leo E. Miller, representative of the American Museum

Museum in the fall the first presentation of the zoölogical results of his recent expedition to South America.

Two expeditions from the department of vertebrate palæontology will be sent out this summer in search of fossils. The first expedition in charge of Mr. Barnum Brown, assisted by Mr. P. C. Kaisen, will confine its operations to the Red Deer River of Alberta, Canada, where it will endeavor to collect Cretaceous dinosaurs, and the second in charge of Mr. Albert Thomson will go to the big quarry at Agate, Nebraska, to secure additional *Moropus* skeletons.

MR. JOHN A. GROSSBECK, a patron of the Museum and a member of the department of invertebrate zoölogy, died in Barbados on April 8. Although Mr. Grossbeck was taken ill more than a year ago, his health seemed to be partially recovered, and in order to regain his strength he was touring the Caribbean region with his brother when he died suddenly during a change of boats.

Mr. Grossbeck came to the Museum about four years ago, having previously been connected with the New Jersey State Experiment Station. While in that institution he made valuable discoveries concerning a wide range

of injurious insects but especially concerning the life history of mosquitoes. His chief scientific interest however was in the Geometridæ — the family of moths whose young are the "measuring worms." On coming to the Museum Mr. Grossbeck gave to it his valuable collection of this group as well as his general collection of local insects. In recognition of his generosity he was made a patron. Mr. Grossbeck devoted himself to the work on insects with untiring zeal and by reason of his broad entomological training was able to further the work in all of its branches. He had already made an international reputation in entomology and it will be exceedingly difficult for the Museum to find a successor who will combine Mr. Grossbeck's willingness to serve with an equal entomological knowledge.

THE Museum wishes to express its sincere sympathy to the bereaved families of two of its workers, William A. Dolan and Christian Hundertpfund of the mechanical staff, who had served the institution faithfully for thirteen and twelve years respectively.

THE publicity committee of the Museum, created during the winter, has been endeavoring to acquaint the people in New York City

with the Museum's exhibits and activities. Sixty thousand folders have been printed and placed in the hotels and steamboats and a number of large framed posters have been put in conspicuous places throughout the city.

THE department of public education of the American Museum is sending photographs and explanatory labels illustrating its work among the blind in New York City, to the Exhibition of the Arts and Industries of the Blind held in connection with the International Conference on the Blind which occurs in London from June 18 to 24.

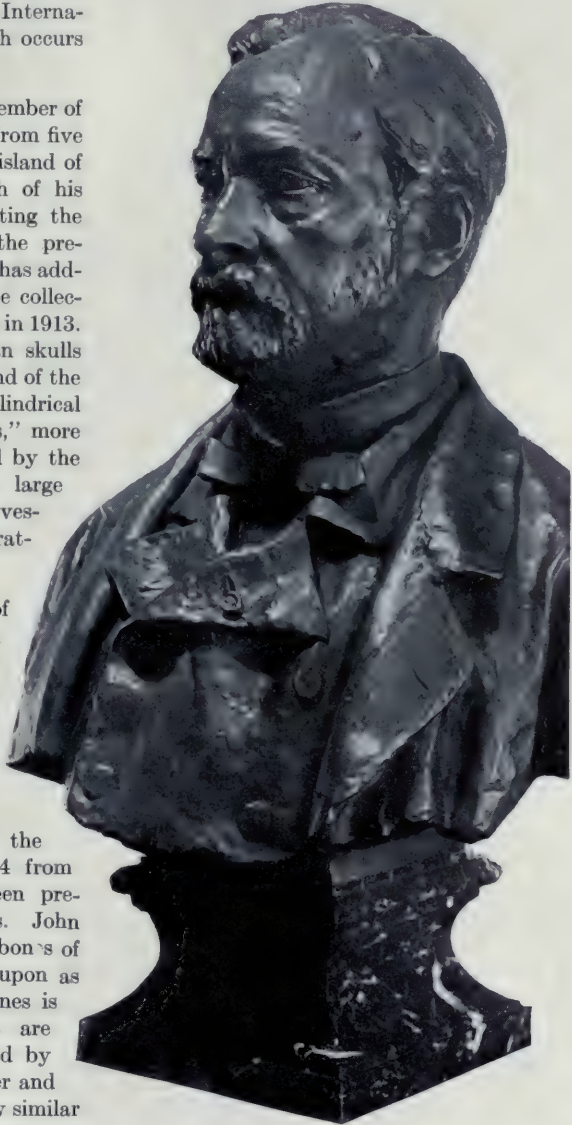
MR. GEORGE C. LONGLEY, a life member of the Museum, has recently returned from five months' archaeological study on the island of Jamaica. Mr. Longley spent much of his time while at the island in excavating the kitchen middens of the Arawak, the prehistoric inhabitants of Jamaica. He has added the results of his researches to the collection presented by him to the Museum in 1913. The additions consist of two human skulls found in a cave in the northeastern end of the island, a stone idol, two perforated cylindrical stones, usually called "chief's stones," more than one hundred stone axes (called by the natives "thunder balls"), and a large number of pieces of broken pottery vessels which show the manner of decorating by incised lines and dots.

A replica of the famous bust of Louis Pasteur by Dubois has been presented to the Museum for installation in the hall of public health, through the generosity of Dr. Roux, Director of the Pasteur Institute in Paris and M. Vallery-Radot, son-in-law of M. Pasteur.

A TIBET apron obtained by the Younghusband expedition of 1903-4 from the largest temple at Lhasa has been presented to the Museum by Mrs. John Magee. This apron is made of the bones of saints or holy men and is looked upon as very sacred. The carving on the bones is unusually beautiful. Such aprons are worn in order that the virtue possessed by the bones may pass into the wearer and he may thus acquire holiness. Few similar examples have as yet found their way to museums. This specimen was exhibited to Museum members for the first time on the evening of May 6 when Sir Francis Edward

Younghusband lectured on "Tibet and the Entrance to Lhasa."

MR. JAMES BARNES of the Barnes-Kearton expedition, which crossed Central Africa under the auspices of the American Museum, has returned to New York bringing with him a splendid series of motion-picture films. Mr. Barnes will give an exhibition of these films to the members of the Museum in the fall.



Bust of Pasteur presented to the Museum by Dr. Roux and M. Vallery-Radot

THE model of the Copper Queen Mine (the full description of which by Dr. E. O. Hovey has been necessarily deferred until the next issue of the JOURNAL) is supplemented by a collection of specimens illustrating the mineralogy of the region about Bisbee, Arizona, another series illustrating the commercial ores of the mines, sets of rock specimens giving the economic and general geology of Bisbee, still other samples showing the smelter treatment of the ores at Douglas, accompanied by photographs of mines, surrounding country and the smelter. Some of the specimens deserve special mention, particularly the group of velvet malachites whose surface is composed of delicate needle-like crystals. A geode-like mass of smooth botryoidal malachite attracts much attention. The great prism of ore, about three feet square by five feet high and weighing about three and one-half tons, occupying a special case, was raised through the Czar shaft of the Copper Queen Mines and exhibited first at the Columbian Exposition, Chicago, in 1893. It contains more than a ton of pure copper besides some silver and gold.

THE New York Academy of Sciences with the cooperation of the American Museum, the New York Botanical Garden, the scientific departments of Columbia University, New York University and other institutions, has begun a scientific study of the island of Porto Rico along the lines of geology, palæontology, zoölogy, botany, anthropology and oceanography. With the assistance of a friend the Academy has voted to expend \$1500 a year for five years on this work and the insular government of Porto Rico has made an appropriation of \$5000 for the fiscal year beginning July 1, 1914, with the expectation that this appropriation would be repeated on each of the ensuing four years. The committee having the work in charge consists of Professors N. L. Britton, James F. Kemp, Franz Boas, C. L. Poor and H. E. Crampton. Mr. Roy W. Miner of the Museum's department of invertebrate zoölogy and Mr. John T. Nichols of the Museum's department of ichthyology and herpetology will be among those who will carry on investigations in Porto Rico this summer.

ON June 4 Mr. Paul J. Rainey, who has recently returned from a two years' residence in British East Africa, gave to the members

of the Museum the first exhibition of his latest motion pictures of African wild-animal life. Because of the popularity of the lecture the auditorium was not only filled at eight o'clock but there was also a large overflow of members waiting for admission. In order not to disappoint these, Mr. Rainey kindly consented to repeat his lecture later in the evening when more than eleven hundred were in attendance. To insure the preservation of the films as scientific records, Mr. Rainey has presented a set to the Museum.

In the May number of *Petermann's Mitteilungen*, appears the first chart to be published of the Bay of Isles, South Georgia Island. The map and accompanying article are by Mr. Robert Cushman Murphy and represent a phase of the scientific work of the expedition to the Subantarctic Atlantic, conducted during 1912-13 by the American Museum of Natural History in conjunction with the Brooklyn Museum of Arts and Sciences. The chart is of further interest to friends of either institution because one of the great valley glaciers in the Bay of Isles has been named "Lucas Glacier" in honor of the Director of the American Museum and another glacier is labeled "Morris Glacier" for the late curator of natural science in the Brooklyn Museum. A third is called "Grace Glacier" for the cartographer's wife and the fourth and largest "Brunonia Glacier" for Brown University. "Point Bellinghausen" commemorating the Russian circumnavigator who made the survey of South Georgia in the year 1820, "Beckman Fiord," named for the Norwegian whaler, and "Cape Woodrow Wilson" are among other localities which have been added to the map of the island.

The Bay of Isles was discovered in 1775 by Captain James Cook. For more than a hundred years it has been a harbor of much importance to sealers and sea elephant hunters at South Georgia. Recently it has been visited by whalers and by the Swedish Antarctic expedition but no survey of its extensive fiords and numerous islets had been published until the present chart appeared.

THE department of geology and invertebrate palæontology will cooperate with the Oklahoma Geological Survey in sending a field party into the Arbuckle Mountains, Oklahoma, during July and August. Dr. Chester A. Reeds of the Museum will be in charge of the party.

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THE

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AMERICAN MUSEUM
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The Museum is open free to the public on every day in the year.

The American Museum of Natural History was established in 1869 to promote the Natural Sciences and to diffuse a general knowledge of them among the people, and it is in cordial coöperation with all similar institutions throughout the world. The Museum authorities are dependent upon private subscriptions and the dues from members for procuring needed additions to the collections and for carrying on explorations in America and other parts of the world. The membership fees are,

Annual Members.....	\$ 10	Fellows.....	\$ 500
Sustaining Members (annually)...	25	Patrons.....	1000
Life Members.....	100	Associate Benefactors.....	10,000
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The Museum Library contains more than 60,000 volumes with a good working collection of publications issued by scientific institutions and societies in this country and abroad. The library is open to the public for reference daily — Sundays and holidays excepted — from 9 A. M. to 5 P. M.

The Museum Publications are issued in six series: *Memoirs, Bulletin, Anthropological Papers, American Museum Journal, Guide Leaflets and Annual Report*. Information concerning their sale may be obtained at the Museum library.

Guides for Study of Exhibits are provided on request by the department of public education. Teachers wishing to bring classes should write or telephone the department for an appointment, specifying the collection to be studied. Lectures to classes may also be arranged for. In all cases the best results are obtained with small groups of children.

Workrooms and Storage Collections may be visited by persons presenting membership tickets. The storage collections are open to all persons desiring to examine specimens for special study. Applications should be made at the information desk.

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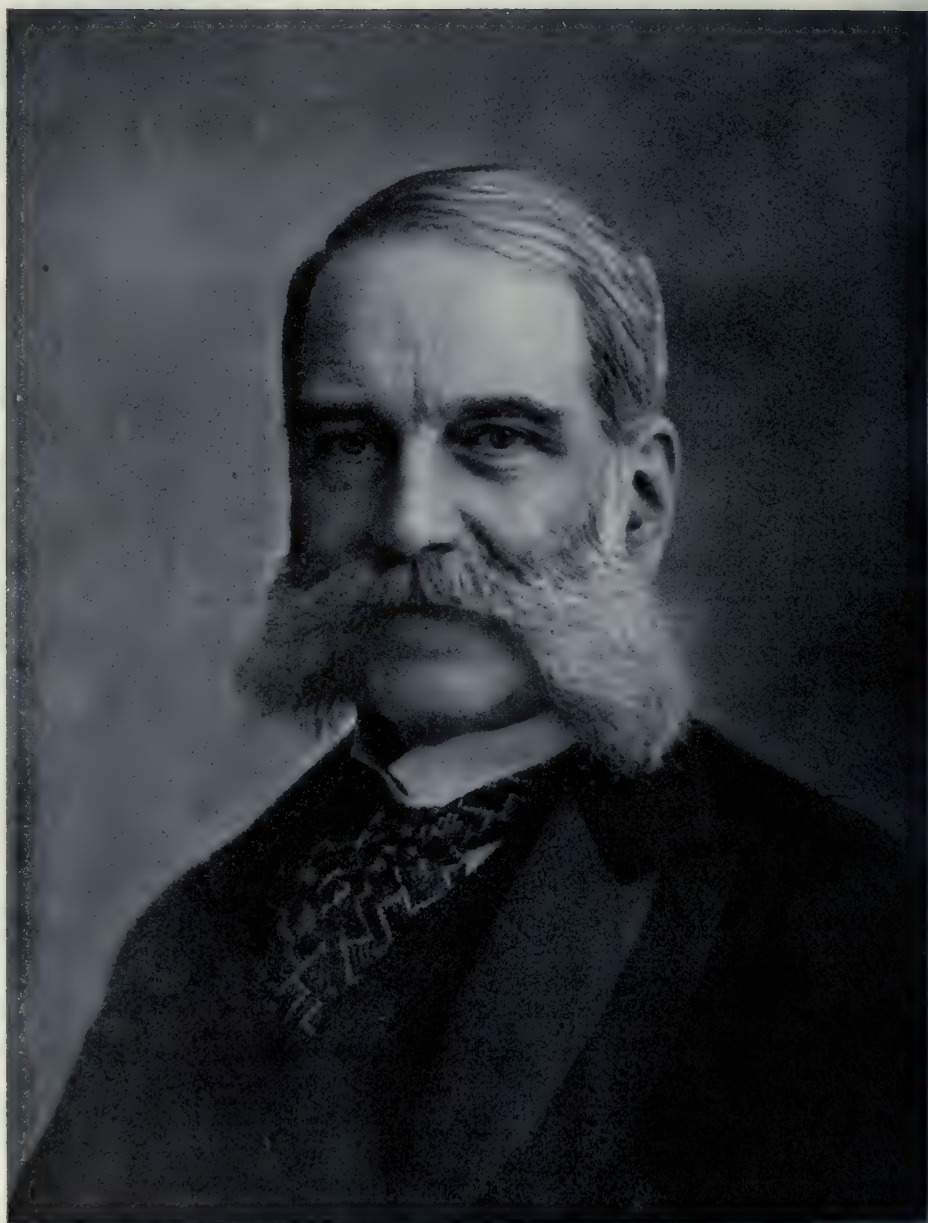
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MARY CYNTHIA DICKERSON, *Editor*

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The Journal is sent free to all members of the Museum.



THE LATE MORRIS K. JESUP, PRESIDENT OF THE AMERICAN MUSEUM OF NATURAL HISTORY 1881 TO 1908, FROM WHOSE ESTATE HAS RECENTLY COME TO THIS MUSEUM OF THE AMERICAN PEOPLE A BEQUEST OF FIVE MILLION DOLLARS

THE AMERICAN MUSEUM JOURNAL

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THE MUSEUM OF THE AMERICAN PEOPLE

THE MORRIS K. JESUP ENDOWMENT FUND OF FIVE MILLION DOLLARS, A RECENT BEQUEST OF MRS. JESUP, RESTRICTED TO EDUCATIONAL AND SCIENTIFIC WORK.—MAINTENANCE AND BUILDING OF THE INSTITUTION STILL IN THE HANDS OF THE CITIZENS OF NEW YORK CITY ACCORDING TO THE ORIGINAL PURPOSE OF FOUNDATION

By Henry Fairfield Osborn

THE Morris K. Jesup Endowment Fund, which comes to the Museum through the bequest of Mrs. Jesup, marks another turning point in the history of the institution, and places the educational and scientific work on a firm foundation for all future time. In amount this is the largest gift which has ever been made to scientific education in the great City of New York, and if administered, as it will be, in an intelligent and patriotic spirit, it will doubtless exert a lasting influence upon the people not only of this municipality, but also of the entire country and even upon the peoples of all other countries.

The American Museum has long ceased to be a civic institution and like its noble sister, the National Museum of Washington, has outgrown the bounds even of a national institution through close coöperation and cordial relations with similar organizations in all parts of the world. The Jesup Fund will strengthen and extend this spirit of enlightenment around the globe. Recalling the broad purpose of Mr. Jesup's administration, we wish it were possible for him to witness the results which will flow from his benefaction.

This endowment has been welcomed by our own Museum and by all other

institutions of the country because of the example and the standard set to public-spirited citizens in other municipalities.

A very wise restriction which surrounded Mr. Jesup's original bequest and which also obtains in this, is that *no part of the interest shall be used for maintenance or for building.* Mr. Jesup intended that the responsibility for the upkeep and construction of the Museum should rest upon the people of the City of New York, according to the original purpose of its foundation. He desired it always to remain a public institution—one which the people of our great municipality can feel is in part their own, because they build and maintain it.

This, we believe, is an expression of the finest civic judgment. Indeed, the men who become known as great citizens through their personality or through their generosity, should not assume the duties and responsibilities of all citizenship. This is not the true American spirit and it is not the spirit which animates an institution rightly known as "American."

It is necessary to lay emphasis upon this important feature of our charter at the present time. We believe that the people of the City of New York have learned to love the Museum and to feel

the inestimable advantages which it extends to all and particularly to the young, and we also believe that the people are willing to do their share in maintaining and in extending the building, in order to make it possible to reap the benefits of this munificent fund.

In the death of Mrs. Morris K. Jesup on June 17, 1914, the Museum lost another member of the original and distinguished circle of its founders, for through her very close association with Mr. Jesup's interests and ambitions during his lifetime, and her constant sympathy in, and support of, all his plans and undertakings, we may always recall Mrs. Jesup's name with that of her husband. Her personal concern in the welfare of the Museum was not lessened but rather deepened after Mr. Jesup's death, because it was her earnest desire to represent and continue his interests, and her judgment and her gifts were always guided by what she believed he would have wished her to do. Her visits to the Museum were full of association with his plans, and after the lapse of a few years became a source of increased delight.

Mrs. Jesup's interest in the Museum, like that of her husband, was so broad that it extended to practically all departments. One evidence of this is the character and variety of her gifts to the institution. Among her early gifts was a large mass of pink tourmaline from San Diego, California, which enriched the collections of the department of mineralogy. Through her generosity the department of anthropology received a large collection of ethnological material from the Arapaho. She also presented an important series of specimens illustrating the industries, ceremonials and

art of the Shoshone, Bannock, Ute and Kootenai Indians and later ethnological collections from the Gros Ventre, Assiniboine, Crow and Sioux. The department of vertebrate palæontology is indebted to Mrs. Jesup for a skeleton of *Tyrannosaurus*, a skull of *Triceratops* and other remains of dinosaurs of the Upper Cretaceous beds of Montana. She also gave funds through which were obtained skulls and skeletons of *Diadectes*, *Pariotichus*, *Dimetrodon* and other primitive reptiles and amphibians of the Permian of Texas. The departments of invertebrate zoölogy and of mammalogy and ornithology were enriched by the collections that were secured through her generosity.

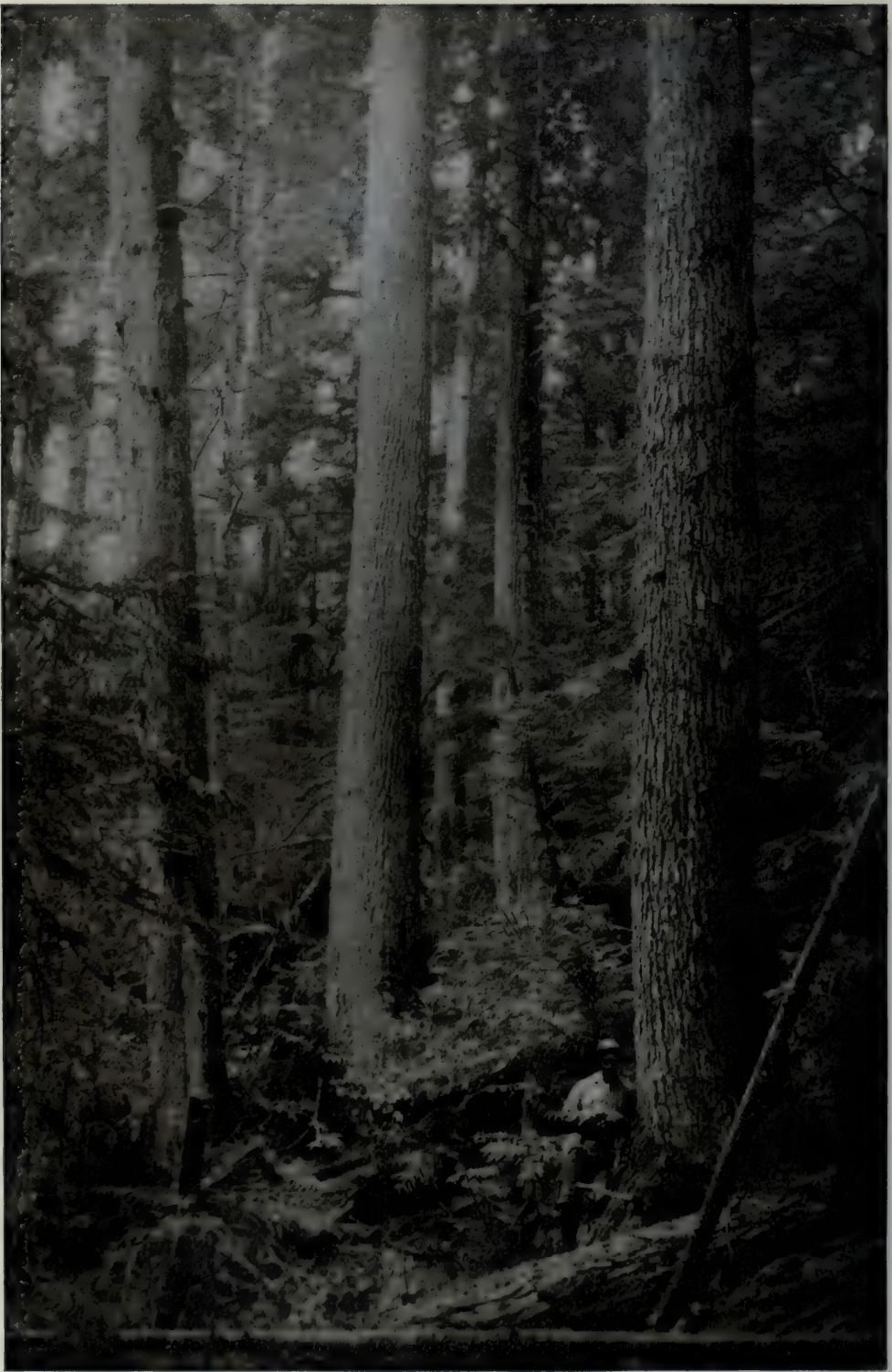
Perhaps the most important of her gifts were the three Cape York meteorites — "Ahnighito," "Dog," and "Woman," presented to the Museum in 1908. These meteorites were brought from Cape York by Admiral Peary. "Ahnighito" is the largest known meteorite in the world, weighing thirty-six and one-half tons.

In 1913 Mrs. Jesup offered to contribute \$25,000, one-half of the sum needed, to equip the second Stefánsson expedition, but as Mr. Stefánsson's work was taken up by the Canadian Government, Mrs. Jesup was never called upon to make this contribution.

The pleasure which a great bequest gives to all the friends of the institution is shadowed by a feeling of sorrow when it comes with the loss of such a noble-hearted woman. It is true that Mrs. Jesup's name will endure in association with her many individual gifts, but we hope that the Trustees may find a way of perpetuating her memory in connection with some special exhibition or collection.

SERIES OF PHOTOGRAPHS
SUGGESTIVE OF THE PRO-
GRESSIVE POLICY OF OUR
NATIONAL AND STATE
GOVERNMENTS IN REGARD
TO FOREST CONSERVATION

PLATES REPRODUCED THROUGH
THE COURTESY OF THE AMERI-
CAN FORESTRY ASSOCIATION
AND THE NEW YORK STATE
FORESTRY ASSOCIATION :::::



IN THE COAST FOREST OF BRITISH COLUMBIA

Such balsam and hemlock forests with trees two hundred feet high may average more than 100,000 board feet to the acre and are attractive investments for paper pulp. We must realize that trees of this size will probably never reappear on the cut-over land under any system of federal or state reforestation and protection, for the commercial demand will always be so great that trees of smaller size must satisfy it



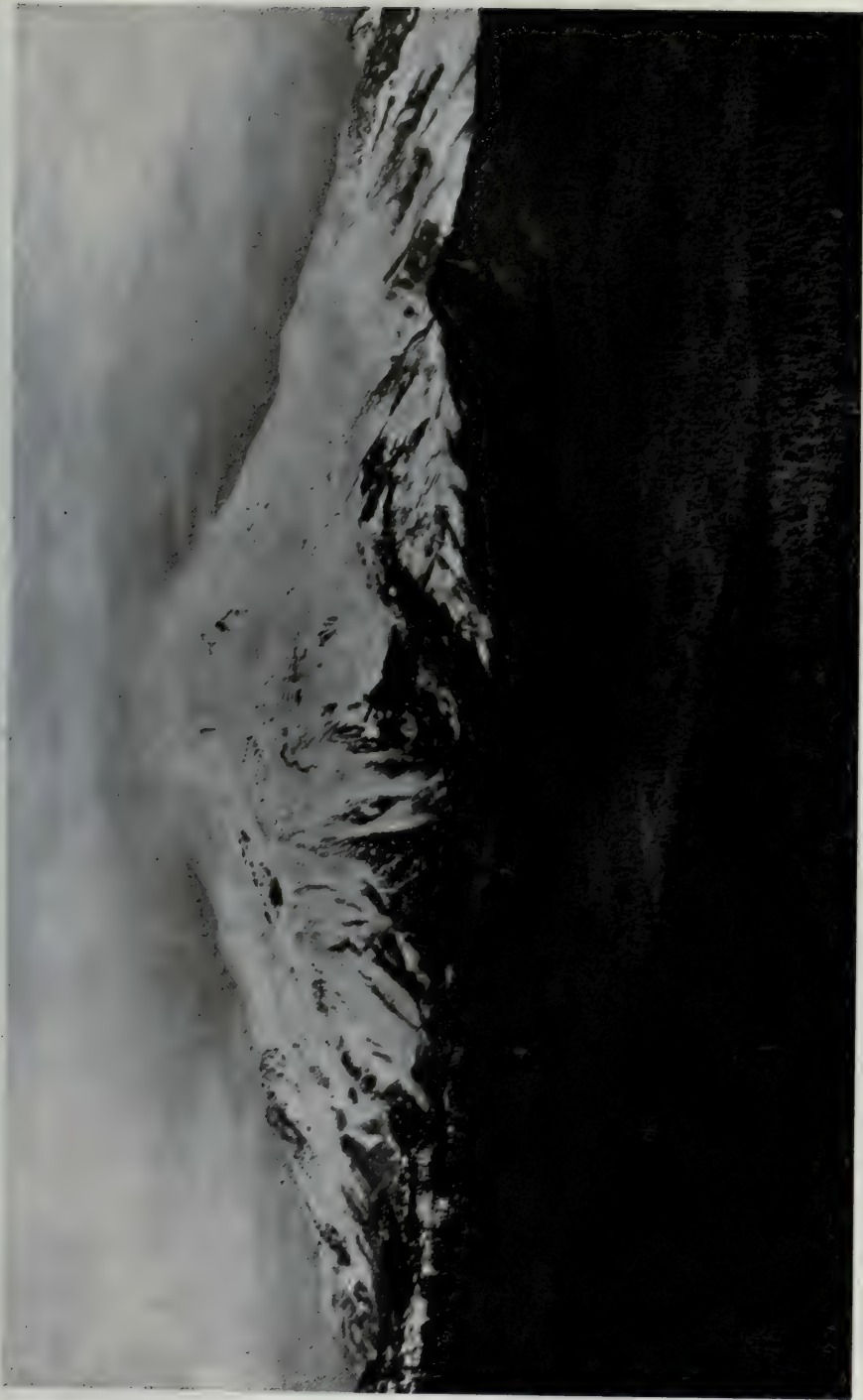
PRIMEVAL FOREST IN NORTH CAROLINA

In the Appalachians and White Mountains more than 1,100,000 acres have been acquired for national forest purposes. The various states concerned are in coöperation with the national government in giving fire protection to the forested watersheds commanded by these lands, and federal management will aim to increase productivity in timber, grazing and other forest resources



TROUT STREAM IN PISGAH FOREST, SOUTHERN APPALACHIANS

Pisgah Forest (86,700 acres), developed for twenty-five years by the late George W. Vanderbilt until it became one of the finest forest properties in the country, has now come into the possession of the government and will remain an object lesson for Americans. It has had protection not only from fire but also from destructive lumbering. Mr. Vanderbilt believed private ownership a public trust and that no man was a good citizen who destroyed a growing forest for selfish ends



MOUNT JEFFERSON, CASCADE NATIONAL FOREST, OREGON

Surrounding Mount Jefferson are many square miles of unbroken forest cover, for the watersheds of streams. It is easy to understand how such forested land forms a "sponge" to retain and send down slowly throughout the summer the water from spring rains and from the melting snows of higher land. It is easy to understand also the cause of the spring floods and summer droughts when such forests are destroyed by fire or the lumberman and these rains and melting snows are permitted to rush unchecked down the steep slopes



RECENT ERUPTION OF MOUNT LASSEN, CALIFORNIA

The Forest Service lookout on Mount Lassen, California, in Lassen National Forest, commanding a view of the surrounding hills for the purpose of fire prevention, was destroyed in the eruption of June 12, 1914. A new lookout station is being located on Brokeoff Mountain, a few miles distant from Mount Lassen



FIRE HAVOC ON BITTER ROOT MOUNTAIN, IDAHO

If ground fire gains a start during a time of heavy wind, it is likely to spread to the tree-tops and cause great loss of life and homes as well as of forest property. There is no way to fight such a fire except to start a second fire back to meet the main fire so that both will die out for lack of fuel. Government care of forests aims to prevent fires from obtaining such destructive proportions



TELEPHONE CONNECTION IN FLATHEAD NATIONAL FOREST, MONTANA

The government forest ranger (appointed through competitive examination in the Civil Service) guards on the average 168 square miles, or more than 100,000 acres. He keeps a lookout for fire, cuts trails, builds bridges and installs telephone lines connecting his lookout with near towns in case help is needed in putting out fires. He also gathers hundreds of bushels of seeds, prepares land for nurseries and raises and transplants young trees. He must also enforce game laws and protect those holding permits for grazing or other use of the forest



Seed collecting camp in a Rocky Mountain national forest. Note the sacks of cones, and the cones spread on canvas sheets to dry

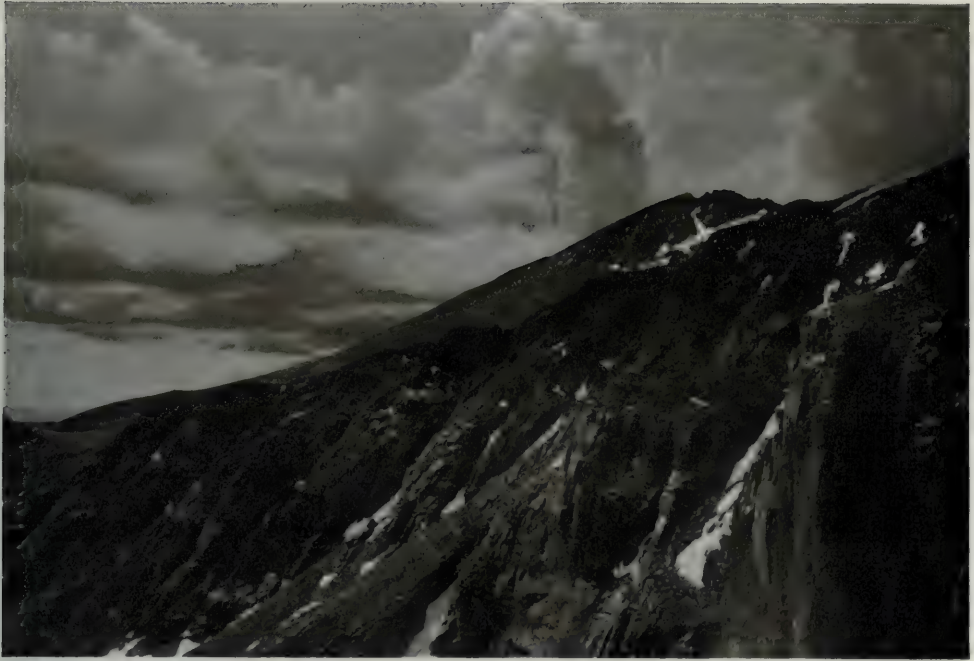


Planting western yellow pine in Pike National Forest. Pike's Peak (14,000 feet high) commands watersheds of great economic importance. Some fifty years ago, in the days of the early white settlers of the region, 10,000 acres of the forest cover were wholly destroyed by fire. The Forest Service is now reforesting the watersheds that supply water to Colorado Springs, Colorado City and other important districts



SHEEP RANCH IN THE COLORADO NATIONAL FOREST

In the West the government acts as a public service corporation to the live stock industry on which the country depends. The stock growers, who are now almost without exception resident ranch-owners, cooperate with the Forest Service in its general progressive policy, especially in improvement of forage conditions and prevention of fire



Area too rough for domestic animals, given over to mountain sheep, Mount Evans, Pike National Forest. Coöperation between State Game Departments and the National Biological Survey is placing game upon suitable unoccupied ranges. Two hundred elk were thus placed in 1913



Summer camp in Crater National Forest, Oregon, under special use permit. National and state forests are great public playgrounds open to all who enjoy camping in a country of beautiful scenery and good sport



A VIRGIN STAND IN THE ADIRONDACKS

The 1,800,000 acres owned by the state could serve as a playground for all New England and New York, if camp sites could be leased. If the ripe timber could be cut, a splendid revenue could be derived. [Quoted from the *Bulletin of the New York State Forestry Association* for June, 1914]

FORESTRY IN THE STATE OF NEW YORK

By Mary Cynthia Dickerson

INTRODUCTORY NOTE: It chanced that the American Museum, for the main part zoölogical and anthropological, has a practical interest in the forests of North America and their conservation. This interest is founded on the fact that some thirty years ago, in the pioneer days of the forestry movement, the former president of the American Museum, Morris K. Jesup, created here a department of woods and forestry and installed the greatest collection of tree specimens in the world, the Jesup Collection of North American Woods.

We are to-day reminded of Mr. Jesup's interest in forestry, not alone by Mrs. Jesup's recent bequest to the Museum which calls to mind all of her husband's long devotion to the institution, but also emphatically by the present condition of forestry in the state. If the forest reserves of to-day had existed in Mr. Jesup's time, he would have been filled with rejoicing at so great a consummation of his desires. He urged that various forested lands be set aside as state forests, especially certain areas in the Adirondacks controlling the watershed of the Hudson. His words are on record: "A wise and comprehensive state policy will seize upon the whole forest region [known as the Adirondack Wilderness] and keep it for all time as a great forest preserve and in this way insure abundant water to the Hudson..." Mr. Jesup strove for this. He argued the matter before the Chamber of Commerce (1883) and even went to Albany and made personal appeal before a special committee of the Senate. He explained how forests store up rainfall, keeping it from evaporation and particularly the melting snows of high mountain ridges, and thus provide constant and equal water supply to the rivers which have their sources in the region. As a result of the campaign that he inaugurated, a law was passed creating an Adirondack preserve (1885).

"FORESTRY in the state of New York is flourishing everywhere except in the woods," was Gifford Pinchot's introduction to an address on the Adirondack forests before the Camp Fire Club of America in 1911. This introduction was followed by an onslaught of facts in which non-use of the state's holdings in the Adirondack region combined with fires on these holdings, and bad logging and needless destruction combined with fires on the holdings in the hands of lumber companies and private individuals made out a very poor showing for New York. In the three years since that time there has been definite improvement, yet the condition of forestry in the state has been unusual from the first and has truly flourished more in clubs, associations, commissions and even in legislatures than "in the woods."

More than 1,800,000 acres of land constitute the forest reserves of New

York State to-day.¹ This is more than any other state has set aside, Pennsylvania of pioneer interest and largely responsible for the movement in other states, coming nearest with 983,529 acres.

Notwithstanding the satisfaction to be felt at this relatively large acquisition of state lands, a vigorous campaign has recently been waged and is still in progress to bring about various changes in the laws of the state, for the greatest hindrance immediately in the way of progress is a matter of legislation. In 1894 laws were passed prohibiting all direct use of the state reserves. The Constitution reads as follows (Section 7 of Article 7): "The lands of the state, now owned or hereafter acquired, constituting the forest preserve as now fixed by law, shall be forever kept as wild forest lands. They shall not be leased, sold

¹ 1,825,833 acres, in 6,850 parcels. Report of the New York Conservation Commission, January 1, 1914.

or exchanged, or be taken by any corporation, public or private, nor shall the timber be sold, removed or destroyed."

The people cannot lease camp sites in the forests or fish from the streams, whereas these state forests should constitute playgrounds for the people as do the national forests, under special permits. All cutting of timber is forbidden. Such prohibition was no doubt wise in 1894 when past wastefulness and misuse needed a sharp lesson, in order to save the remaining forests for important watersheds, and when forestry was a rather vague thing and understood itself less well than in 1914.

Now our national forests have pursued for a period of seven years the policy of utilization, of course under the control of trained foresters, and the policy has been proved wise, as it had been proved previously in Europe. Over-mature timber should be cut, for the sake of the younger timber and for the prevention of fire, to say nothing of the matter of revenue, and this cutting does not detract from the permanent value of the forest but enhances it instead.

Besides in the twenty years between 1894 and 1914 New York State has undergone important economic changes. There are three million people added to the six millions then in the state, crowded into the same cities, demanding food as well as wood and other materials for industries from the same area as then. While there has been this increase in the ratio of population, there has been a decrease in the ratio of wood-producing lands, by the very creation of a larger forest reserve, because of forest fires and particularly because of the continued marketing of crops from private and corporation-owned forests without provision for new growth of timber to take the place of these crops.

To-day if it were not for the constitutional prohibition, utilization from state lands of just overgrown and dead timber (for trees are like all other living things in that they reach maturity and die), without injuring the forests either in their present protection of river sources or in their future timber supply, could give to the state a revenue of at least one million dollars annually. This would help to counterbalance the twenty to thirty million dollars sent out of the state every year for wood to use in industries.

There has been in recent years notwithstanding, considerable legislation in New York regarding forestry matters. Each year the state has made various appropriations for fire prevention and reforestation, sums that seem large until viewed in relation to the magnitude of the work to be done. There are laws enjoining stringent penalties for the negligent starting of fires. Since 1909 as a matter of fire prevention, lumbermen have been obliged to lop the branches from discarded tops of trees so that they will all lie close to the ground and decay quickly.

There has been legislation (1912) especially intended for private owners who wish to grow trees. New York and Michigan are progressive beyond all other states in regard to taxation in such cases, the land being exempt or taxed at a low rate, the crop taxed only when cut.

In 1913 an amendment to the constitution authorized the state to use its forest preserves (in amount not to exceed three per cent) for the development of water power and the establishment of a storage reservoir in the Adirondacks.

Finally there seems now to be in sight for 1915, legislation touching the crucial points of the prohibition. In January, 1914, a resolution was passed amending Section 7 of Article 7 of the constitution to allow the removal of mature and dead timber from the reserves, as well as to

permit leasing of camp sites. Like all constitutional amendments however, it must be brought before a second legislature and then run the gauntlet of the people's vote before it can become active law.¹ The proposed amendment has received large attention within the state and without. If the prohibition should be removed and the state be given control of the management of its forests on the principles of scientific reforestation, culture and cutting, such as is adding to the economic advancement of our national forests, New York State will undoubtedly be assured a steadily increasing prosperity for the future.

The state situation is one that calls for much constructive work with large appropriations to carry it through, and the work will later yield sustained financial and other profitable returns just in proportion to the amounts expended in this preliminary preparation. New York used to be a great lumber-producing state. It was the greatest in the nation in 1850. It has now dropped to twenty-fourth rank. On the other hand New York is at present the greatest wood-consuming state in the Union, requiring approximately two billion board feet every year in the wood-using industries. It is thus easy to understand that we must annually send outside of the state for something approaching thirty mil-

lion dollars' worth of lumber — for Douglas fir, western cedar and redwood from across the whole breadth of the continent; for yellow pine and southern cypress from the Gulf States.

The point is that New York can be made self-supporting in its wood industries. No state in the Union is more advantageously equipped for profitable lumber production, in climate, rainfall, soil, facilities for marketing and amount of lands more suitable for tree crops than for agriculture. The estimate is that from twelve million to fourteen million acres in New York (seven millions of which are idle lands on the farms of the state) can eventually be given over to forest growth because not suitable for other purposes, while experts personally experienced in the study of the forests of Europe maintain that fifty years of the right care ought to make many of our forests, the Adirondack region for instance, compare favorably or even surpass the Black Forest or any of the famous forests abroad.

With these facts in mind and with the knowledge that to-day in our state reserves even, immense areas are wholly cut over or burned and others are covered sparsely with trees of little value, review the situation in the state. Look ahead at what can and should be. Look at the present condition. Surely we are at the very beginning of the work, with little done except tree planting in relatively small amount, only enough to serve well as guide in future work, even though greater than has been done by any other state, and in addition a considerably increased protection of our forests from fire — although here only of the state forests for there is no state-wide fire law. Something over fifty observation towers have been built in the Adirondack and Catskill regions, on mountain heights from which the country through a radius

¹ This will mean that the amendment must pass a majority vote of the new legislature of January 1915 and then be adopted or rejected by the people's vote in the fall of 1915, if adopted becoming active law the following January. It chances however that this fall sees the election of delegates to a constitutional convention to meet next May — since the original constitution of New York State provides that a convention shall be elected at least once in twenty years for a re-drafting of constitutional law and the last such convention met in 1894. Thus it is a dramatic moment for forestry interests in that they can work for an active law allowing use of state lands and giving state-wide fire protection through two bodies, the regular legislature of 1915 and the constitutional convention, the latter like the former having power to pass a constitutional amendment directly to the people's vote if it so desires.

of twenty miles can be seen by the aid of field glasses. The necessary telephone connections have been made between the lookouts and neighboring villages. This system gives the right kind of protection but must be greatly extended before the state will be freed from forest fires.

We are at the beginning of work which promises prosperity yet can scarcely set out on it for lack of the support of an ardent and united public sentiment throughout the state. The most important step toward obtaining this was taken somewhat over a year ago when the New York State Forestry Association was organized. This aims to co-ordinate all the forestry interests of the state, having on its executive committee representatives from each of the other organizations interested in particular aspects of the forestry question. It can speak of forestry authoritatively to the people and can stand authoritatively on forest problems between the people and legislative bodies.

Another important step in advance was the creation of a state school for education in forestry with Dr. Hugh P. Baker, formerly of the Pennsylvania State College, at its head. This is known as the New York State College of Forestry and is in connection with Syracuse University. It is already making its influence felt not only in technical and practical forestry in forest camps and laboratory but also in lecture and exhibition work before all sorts of organizations and on all sorts of occasions. It is also taking active measures to further forestry teaching in the schools, hoping to reach the interest of parents through the children. Thus it may be that if this amalgamation of forestry interests and widespread education continue, a very few years will see New York State well started toward the great future the forestry prophets predict.

To reach this future the state will extend its system of fire prevention to all the forests within its boundaries. Our state reserves will be increased by a still greater acreage, since forestry interests must perforce remain in the hands of the government, the length of time before a crop can be financially realized on and the passing instead of permanent interest of the individual owner precluding any great amount of private forestry practice — even though the crop be exempt from taxation during the period of growth.

To reach this golden future the state's holdings will be kept outside of the influence of politics and commercialism and the management will be in accordance with the judgment of the state's trained foresters. Steady progress will be made year after year in planting or naturally reforesting denuded areas until all mountain sides to timber line, all hillsides, all lands in any situation incapable of producing agricultural crops of good quality, will be covered with deep forest. Wise systems of reforestation will give also the varieties of wood best adapted for our definite industries, and scientific care may possibly so increase rapidity of growth that many of our cherished kinds of wood which we thought barred to us for the future because of their slow growth may be made to reach maturity in a fraction of the time required by nature's methods unaided. Conservative systems of cutting will yield state revenues year after year from marketing ripe timber, while there will still remain for to-day and for the future these same state forests, always unimpaired in their control of water supply and in their almost unrivaled beauty, as recreation places for those who are obliged to spend the greater number of their days in cities.

PALÆOLITHIC ART AS REPRESENTED IN THE COLLECTIONS OF THE AMERICAN MUSEUM OF NATURAL HISTORY

By George Grant MacCurdy

THE specimens that form the basis for this paper were collected during the summer of 1912 by Professor Henry Fairfield Osborn, president of the American Museum of Natural History, and myself.¹ They are of



Crenate flint scrapers from the Abri Blanchard (Dordogne), Middle Aurignacian Epoch. These and many other specimens obtained by the American Museum in 1912 are representative types of Aurignacian industrial remains similar to the original specimens found in 1863 in the cave of Aurignac and now in nearly all excavations of European caves and recognized as showing Aurignacian culture

¹ A map of southwestern Europe showing the principal cavern regions is to be found in the December, 1912, *JOURNAL* (opp. page 280). The map accompanies an article descriptive of the motor journey taken by Professor Osborn and Professor MacCurdy to European palæolithic caverns in 1912 when many valuable specimens were obtained to fill gaps in the American Museum series. The January, 1913, *JOURNAL* contains a previous article by Professor MacCurdy on "Cultural Proof of Man's Antiquity."

especial importance because of their bearing on the technology and art of the upper palæolithic period, and were selected with the especial object of filling

serious gaps in the Museum series. Of the three great art epochs, Aurignacian, Solutréan, and Magdalenian, we were fortunate in securing an original engraving from two — the first and the last. Objects of personal adornment and industrial remains, especially type specimens, were also collected.

The chief interest however centers in the two engravings, because of the policy of the French Government to reserve for itself everything in the line of palæolithic art; and in this respect the Government has the support of public sentiment. This spirit is not only easily understood, but also highly commendable in view of the world-wide interest that attaches to the subject of Quaternary art. Old masters come high; why not also the oldest masters? Each new find is reported immediately to the Paris Academy of Sciences. Some half-dozen Aurignacian engravings on mammoth bone and on pebbles found on October 3, 1913, in the rock-shelter of La Colombière, valley of the Ain, about thirty miles southwest of Geneva, were presented before the Paris Academy on October 20, and early in November full details of the find with illustrations were republished in New York City. The discovery at La Colombière created unusual interest because in two instances the human form was represented.

The names of the palæolithic culture stages are now almost as familiar to the general reader as are those of the geologic epochs. Gabriel de Mortillet had more to do than any other one man with building up and popularizing this system of classification. To him however, does not belong the credit for introducing into the system the term "Aurignacian" and for placing it where it belongs, viz., between the Mousterian and Solutréan epochs; although at one time he was inclined to differentiate an additional



Bone points from the Abri Blanchard, Middle Aurignacian Epoch. The flint industry was at a high stage in the Aurignacian Epoch and later declined as the making of implements and ornaments of bone increased

epoch and call it the Aurignacian. He at first followed the lead of Lartet, the explorer of Aurignac, and placed the Aurignacian where it rightly belongs, but later placed it between the Solutréan and Magdalenian, and finally dropped it altogether from his classification. Forty years ago Edouard Dupont of Brussels felt the need of an epoch not at that time provided for, which would include the culture stages represented in the caves of Montaigne and La Hastière (Belgium) — namely, stages that are now known to be Aurignacian. It was however reserved for the Abbé H. Breuil, ably seconded by Cartailhac and Rutot, to differentiate and firmly establish this culture. The name Aurignacian was well chosen because it was from the cave of Aurignac (Haute-Garonne), that industrial remains of the type in question were first reported [by Lartet in 1863].

Now one scarcely opens a cave in Europe without encountering Aurignacian deposits. Much of the palæolithic mural art is likewise of Aurignacian age, proving the latter to have been the first great Quaternary art epoch. Then sculpture in the round and high relief flourished as they perhaps never did again, and the arts of engraving and of drawing in colors had their birth. A new race, the immediate ancestry of which has not yet been definitely traced, supplanted completely the archaic Neanderthal race of Mousterian times.

Physically and mentally the Aurignacians, of which Cro-Magnon and Combe-Capelle are examples, were more nearly akin to modern European races than to the old Mousterians. Like the latter however, they were still hunters. Cave regions such as the Vézère valley favored the increase of population and a more sedentary mode of life. In time this brought in its train a scarcity of game

and fish, the chief food supply. These conditions evidently had much to do in



Lateral gravers from the Abri Blanchard of the Middle Aurignacian Epoch. The Aurignacian artists used gravers made by beveling variously shaped flints

the art development of that period. Nearly all the figures are of favorite game animals. Many of these are represented as hunted or wounded. These and perhaps many more are evidently votive offerings for success in the chase. Other scenes depicted are obviously intended to have a bearing on the multiplication of game. Art and magic therefore were thus early taught in the same school of necessity.

The thickness of the Aurignacian deposits from caves and rock-shelters and the evolution of the culture there portrayed prove the epoch to have been a long one. Many Aurignacian loess stations have recently come to light

making it possible to determine approximately at least the relation of the Aurignacian epoch to glacial chronology. Aurignacian remains occur in the middle and upper part of the recent loess which is assigned to the Würm glacial epoch. Moreover in the cave deposits at Sirgenstein and elsewhere, Schmidt has found immediately below the oldest Aurignacian layers an Arctic fauna characterized by *Myodes obensis*, a species of lemming. The Aurignacian began therefore very near the maximum of the last glacial epoch. Schmidt believes this to have been the second and last maximum advance of the Würm glaciation, the one directly preceding the Achen retreat.



Flint *pointes de la Gravette* from rock-shelter No. 2, Roches-de-Sergeac (Dordogne)



SIMPLE FLINT GRAVERS REPRESENTATIVE OF THE UPPER AURIGNACIAN AGE

This Aurignacian Age toward the close of the Quaternary is thought to have been the time of a new race (Cro-Magnon) which had completely supplanted the race (Neanderthal) of the preceding epoch (Mousterian). The proof lies in such human cultural remains as these flints together with the rare human fossil remains, and the associated animal fossil remains — the horse the dominant animal, the mammoth still flourishing and the reindeer coming into prominence



The American Museum contains these tallies or *marques de chasses* from Abri Blanchard (Dordogne) representing the Middle Aurignacian Epoch, interpreted as records made by Aurignacian hunters

We can thus picture the climatic conditions that attended the birth of Quaternary art in western and central Europe; and climate is no mean factor in the environment of primitive man. Among other things it determines the character of the fauna and thus has a bearing on the fundamental problems of food-getting as well as defense.

Upper Quaternary fauna may be reconstructed from the fossil remains associated with human cultural remains;

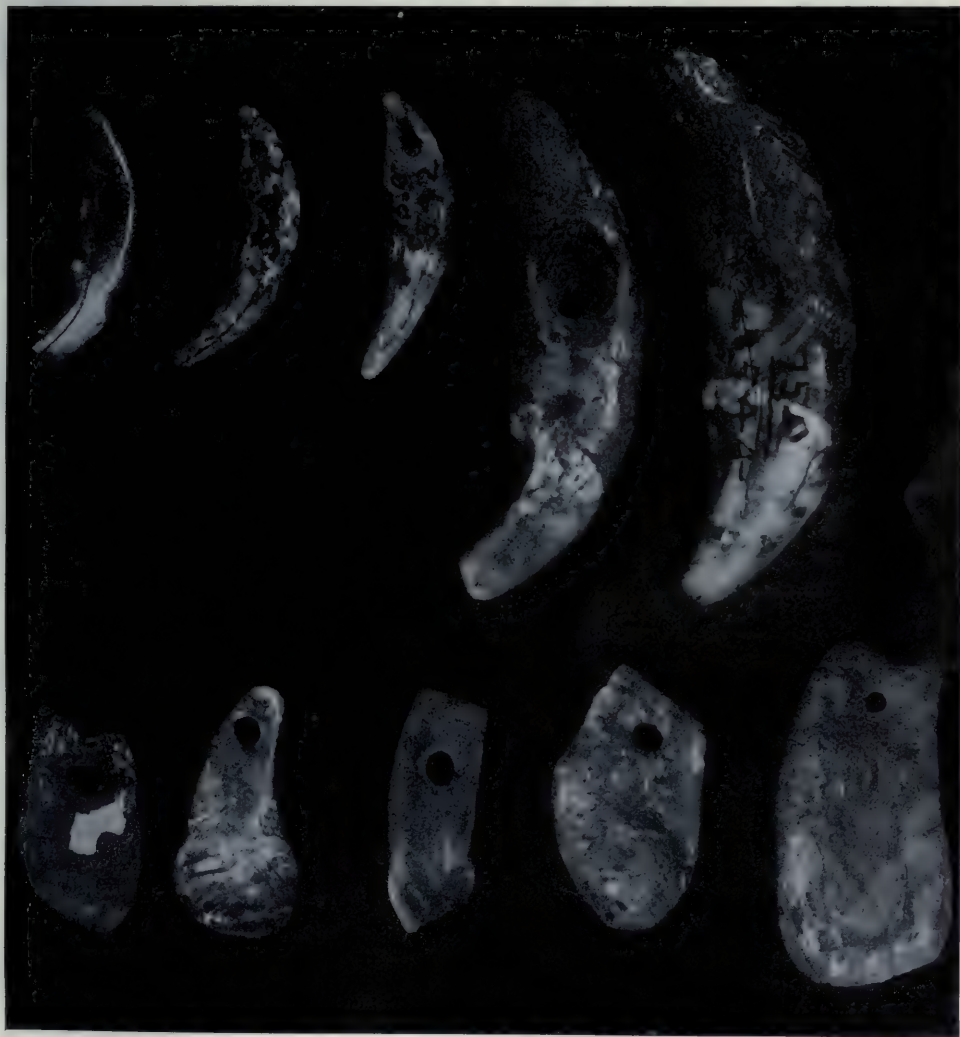
it is also reflected in the art of the time. Judging from both these sources one arrives at the conclusion that Aurignacians and Solutréans were contemporaries of an *Equus* fauna with the horse predominating, the mammoth still abundant, the bison also plentiful, and the reindeer gaining in prominence. The horse and reindeer were dominant in the Magdalenian. *Bos primigenius* plays a secondary rôle in the art of the time and is not conspicuous for its fossil

remains. On the other hand the one station of Solutré (Saône-et-Loire) has furnished skeletal remains of no less than one hundred thousand horses. Moreover in an inventory of Quaternary art the horse leads all with the possible exception of the bison. We are therefore justified in assuming that the steak of horse and bison, and not our indispensable beef steak, was the *pièce de résistance* at all well-regulated palæolithic feasts.

A short distance below Sergeac (Dor-

dogne) on the left bank of the Vézère is a picturesque little valley cut in the limestone formation by a small brook, *Ruisseau des Roches*, tributary to the Vézère. This valley is flanked by shelters that have crumbled away until there is now little if any overhang left to the rocks, the entire group being referred to as *Station des Roches*. Several of these shelters were inhabited by palæolithic man.

This region had been partially ex-

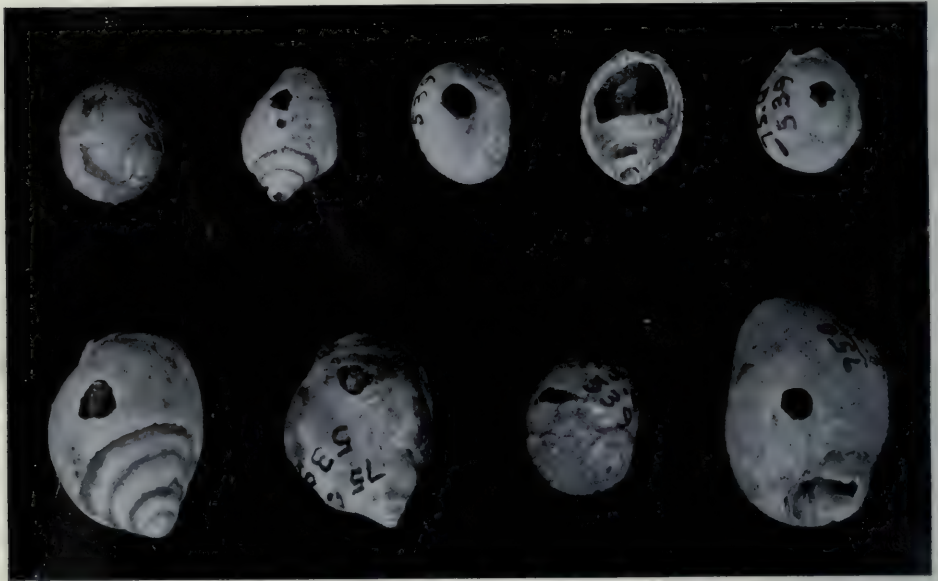


Perforated teeth from the Abri Blanchard (Dordogne), of the Middle Aurignacian Epoch. Excavated caverns and rock-shelters yield large numbers of perforated teeth of the cave bear, lion and reindeer, proving the love of adornment of the Aurignacian people

plored by several prehistorians, including M. Reverdit (more than thirty years ago) and the Abbé Landesque. Recently M. L. Didon, proprietor of the Grand Hôtel du Commerce et des Postes at Périgueux, took leases on some of the more promising shelters and began excavations. The excavations at the Abri Blanchard des Roches, a station representing the Middle Aurignacian Epoch, had been practically completed before our visit and a paper¹ published on the

the valley and within but little more than a stone's throw is the Abri Blanchard des Roches, from which likewise the New York museum secured a collection.

When one comes to weigh the various elements in Aurignacian culture and compare them with Mousterian culture the differences are at once seen to be as great as the physical differences that separate *Homo neandertalensis* from the Aurignacian races. The change from



Perforated shells used for personal adornment from the Abri Blanchard (Dordogne) of the Middle Aurignacian Epoch

results. Station No. 2 des Roches de Sergeac, belonging to the upper Aurignacian epoch had been partially explored by M. Didon who found there not only the large engraved figure of a horse but also many industrial remains of which the American Museum obtained the greater part. These objects were found halfway up the sloping hillside under a thick coating of talus that once formed the overhanging rock. Diagonally across

lower palæolithic to upper palæolithic is so great as to mark in all probability the invasion of a superior race with more advanced culture standards. This new race colonized practically the whole of the Mediterranean coast, African as well as European. The Aurignacians might have come from Africa. One can scarcely think of an oriental origin, for early Aurignacian culture has not as yet been found in Eastern Europe, as pointed out by Breuil.

Lithically the Aurignacian was the

¹ L. Didon in Bull. Soc. Hist. et Archéologique du Périgord Périgueux, 1911.

epoch of the evolution of the bladelike flint flake, with its diversity of marginal retouches. In the lower levels the blades are large and thick with marginal notchings. Large, rude carenate scrapers appear, likewise the lateral type of graver, and the so-called *pointe de Châtelperron*. Bone industry develops, the bone point with or without cleft base being the best known [page 226]. Sculpture is developed to a considerable extent, the female figurines from Brassempouy being examples. In the middle horizons the carenate scrapers multiply, diversify and become less bulky [page 225]; the scars left by the lamellar chipping are long and parallel. Gravers of many types are numerous [page 227].

The upper Aurignacian is characterized by the *pointe de la Gravette* [page 228], the ordinary graver [page 229], and a microlithic industry in which use is made of the splinters produced in the manufacture of gravers. Pedunculate points foreshadowing the arrow head are also met with. The human figurines from Grimaldi and Willendorf and the bas-reliefs from Laussel belong to this stage.

The American Museum possesses a series of records kept by Aurignacian hunters, the so-called *marques de chasse*. Bone was generally used for this purpose [page 230]. The collection also bears evidence to the love of ornament so typical of the Aurignacians in the perforated teeth of the cave bear, cave lion and reindeer [page 231] as well as in perforated shells [page 232].

One curious fragment of limestone in the collection is perforated, for what purpose it would be difficult to say [page 233]. The hole is pierced near the margin and was driven in at an angle from both sides to a meeting point. The block which is heavy might well have served as a weight. Or if the hole was made before the block became detached from the overhanging rock it must be considered as a point of suspension. Didon found a number of such perforated blocks of stone.

The principal piece in the New York collection is an engraved figure of a horse on a limestone slab, that was found in a deposit of upper Aurignacian age at rock-shelter No. 2 des Roches-de-Sergeac [page 236]. This figure, about



Large fragment of limestone from Abri Blanchard (Dordogne). The artificial perforation is driven in at an angle from both sides to a meeting point, and the purpose is difficult to guess. The stone is heavy enough to have served as a weight

sixty-eight centimeters in length, is cut rather deeply into the slab, the surface of which is rough and irregular and had never been prepared in advance for the engraving. Among the tools used by Aurignacian artists were a variety of gravers made by beveling one or both ends of a bladelike flint flake. The work here was evidently done by a larger, heavier tool than the ordinary graver, as the

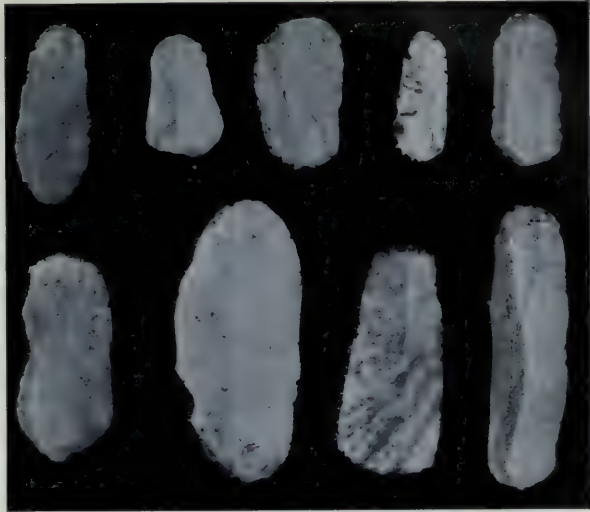
incisions are not only deep, but also broad. Flint tools that might well have served to do the cutting were found in the same station [page 237]. The size of the tool and the irregularity of the surface account in some measure for the apparent crudity of the drawing, which might have been considered as belonging to an early rather than a late phase of Aurignacian engraving.



Flint perforators of Middle Aurignacian Age. (From Abri Blanchard des Roches (Dordogne))

The artist is at times uncertain in his stroke. The curve in the region of the short standing mane is exaggerated and it is difficult to account for the irregularity of the line that begins at the base of the ear and ends at the back of the neck, a little forward of the withers. In drawing the fore legs a false stroke was made that begins at the chest and passes downward slanting outward a little in front of the fore legs. The inability of the artist to represent the legs, both fore and hind, in profile is likewise apparent. Each leg appears independent of its mate as if the two were seen from in front instead of from the side. On the other hand the shape of the body is characteristic for the small Quaternary horse of stocky build whose nearest living representatives are the horse from the desert of Gobi, *Equus przewalskii*, and the native horse on the Île d'Yeu off the west coast of France. That portion of the slab on which the tail and a portion of the outline of the hips were incised had been broken off and was not recovered by M. Didon.

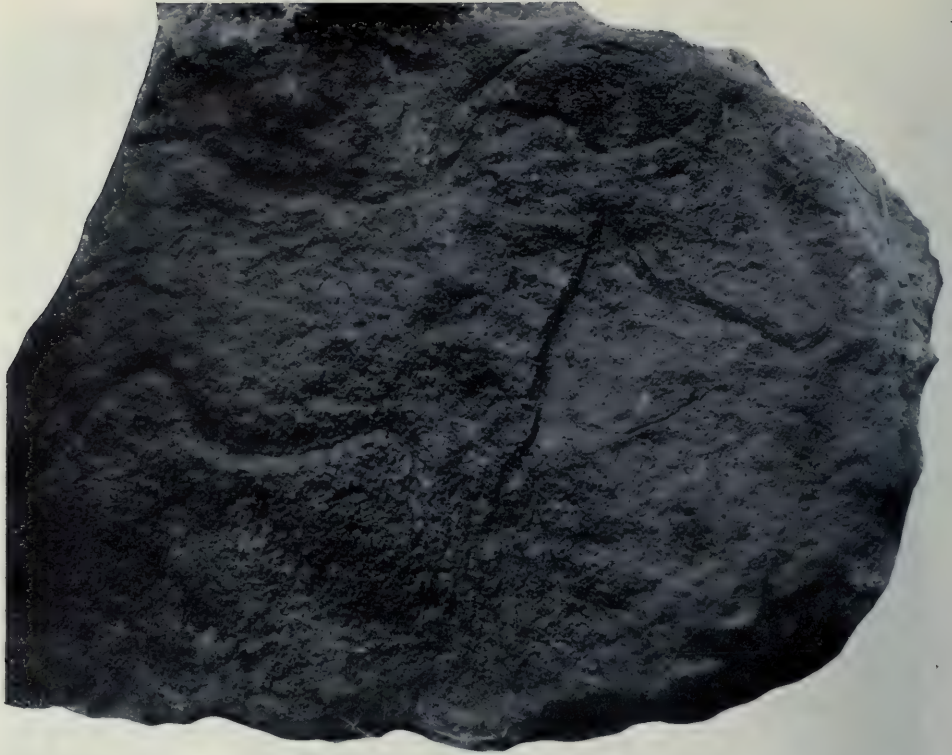
Discoveries of unusual importance have recently been made by the Abbé Bouyssonie at the rock-shelter of Limeuil (Dordogne) on the west bank of the Vézère, opposite the point where it flows into the Dordogne. This station is of Magdalenian age and therefore of later date than the two shelters at Sergeac previously mentioned. Here also the artists left engravings on more or less shapeless slabs of limestone, seventy-nine of which have been recovered, and are now in the *Musée des Antiquités Nationales* at Saint-Germain. The ani-



Flint-scrapers of upper Aurignacian Age from rock-shelter No. 2 des Roches-de-Sergeac



Bone-polishers from the Abri Blanchard



Upper Aurignacian horse from rock-shelter No. 2 des Roches-de-Sergeac (Dordogne). This figure engraved on limestone is one of the principal specimens in the American Museum collection. The figure is about two feet in length and the lines are cut rather deeply. The gravers used must have been larger and heavier than those ordinarily found and in fact flint gravers strong enough for the work have been discovered. The general shape of the horse is typical of the stockily built Quaternary horse whose nearest living relatives are the species from the desert of Gobi, *Equus przewalskii*, and that native to the île d'Yeu off the west coast of France

It is rightly the policy of the French Government to set aside all caverns containing palæolithic drawings and paintings as national galleries of prehistoric art. Each discovery is reported at once to the Paris Academy of Sciences. Thus museums in America are never likely to display the originals and must depend on copies such as have been recently transferred to the walls of the hall of European prehistoric archaeology in the American Museum

imals that chiefly figure in this list are the reindeer, horse, bison, and wild goat. The most beautiful of all is the reindeer represented as browsing. For artistic merit it ranks with the celebrated reindeer of Thaingen.

Figures of the horse are no less interesting. They seem to comprise three fairly distinct types according to Capitan: first, a horse of slender build, small head and erect mane, corresponding to the modern ass; second, a true horse with short but large head, but rather slender body; third, a stocky, hairy horse with heavy mane.

In addition to the engravings on stone slabs some rare examples on bone were also found at Limeuil, one of which was obtained by us for the New York museum. The figure in question is incised on a fragment of the metatarsal of a reindeer and is evidently one of at least two figures, probably a procession. The one most complete lacks the nose, upper part of the head including eyes and left ear, and the fore legs. The hind legs were never indicated. The line of the neck, back and tail forms a graceful sweeping curve. The ear is well drawn, the ear opening being

suggested by an incised line. Its direction, neither forward nor backward, and the general attitude of the figure suggest repose. The length from ear to root of tail is twenty-three millimeters. The only uncertain stroke of the graver is to be seen in the region of the throat. The numerous nearly vertical and parallel fine lines on the neck and back may not be of human workmanship, as similar lines are to be seen at the extreme left of the bone fragment and apparently not related to any animal figure. The figure of a second horse following at a short distance the first described, has

been lost with the exception of the two ears. Here again the left ear is turned so as to show the opening. This specimen represents a late phase of Magdalenian art.

Wherever possible it has been the policy of the French Government to set aside as national monuments all caverns and rock-shelters in which are examples of palæolithic mural art. These will ever remain galleries of prehistoric art. Only in one or two rare instances have parietal engravings or frescoes been cut from their original places. Such a step should be resorted to only when not to remove

the art works would be to invite certain destruction. Where works of this nature are accessible and can be permanently protected, there is as little sense in removing them as there would be in removing the frescoes of Michelangelo from the Sistine Chapel. The museums of this country are not likely ever to possess typical original examples of palæolithic mural art. The American Museum has acted wisely therefore, in transferring to the walls of its hall of European prehistoric archæology copies of some notable originals from the French as well as the Spanish caverns.



Probably crude graving tools; at the left from rock-shelter No. 2 des Roches-de-Sergeac; at the right, from Abri Blanchard. These gravers are large and heavy enough to have served to cut deep lines in limestone as shown on the preceding page



NEWLY FLOODED FOREST ON THE RIO TRINIDAD

Rivers in the Gatún region have risen, as this photograph indicates. The lake of the region, previously a negligible one, has now an extent of one hundred and sixty-four square miles and a depth in places of seventy to eighty feet. In the photograph an iguana can be seen on the upright stump and a white egret on the log at the centre



Water front of Panama City where the boats come in to market, in the early morning soon after day break, loaded with fruit and vegetables from the neighboring islands

NEW FAUNAL CONDITIONS IN THE CANAL ZONE

By H. E. Anthony

With flash-light photographs taken by Mr. George Shiras and many photographs by the Author

DURING the months of February and March of this year it was the good fortune of the author to accompany, as an American Museum representative, Mr. George Shiras, 3d, on a trip to the Canal Zone. Mr. Shiras desired to obtain photographs by flash light of the animal life of that region, a method of which he is one of the foremost exponents to-day and

which has yielded him some remarkable results in temperate regions. It was through his generosity that the Museum was able to send a collector to Panama with him.

It was expected that faunal conditions in the Canal Zone would be undergoing abrupt changes because of the damming of Gatún Lake and the consequent extensive high water. From a basin with no lake worthy the name, with standing water confined largely to marshy areas except during the height of the rainy season, the Gatún region has been transformed by the huge dam at the locks into a lake of one hundred and sixty-four square miles in extent and a depth of seventy to eighty feet in many places.

EDITORIAL NOTE: The expedition worked under authority from the Canal Commission. It is of note that Colonel Goethals, as the first civil governor of the Canal Zone, continues adherence to the policy he maintained during the engineering work in the region — namely, that the Isthmus shall be a game preserve. Exception to the observance of the laws against shooting game outside a short open season will be made only in favor of such occasional zoological expeditions

This flooding of ground formerly high and dry, it was anticipated, would drive many animals to seek new homes or might even threaten some of the more restricted, lowland-living animals with extermination. Incidentally many of the islands and ridge crests left above water might have a concentrated fauna driven there from the adjacent flooded localities. Other phases of the question dealing with the newly created lake, were

vestigation, it was planned to work from a house boat as a base camp with a launch and small boats for side trips. Accordingly a boathouse was made over by a few alterations, but only after considerable time had been spent in trying to secure something available for the purpose. The house boat was so low in the water that she could be towed only in a calm sea, a condition of the lake only rarely met with, and at the best



It was because of the flooding of the Gatún Lake basin by the huge dam at the Gatún locks, thus causing abrupt changes in the faunal conditions, that an expedition under the patronage of Mr. George Shiras, 3d, was undertaken. The house-boat formed the base camp from which trips were made by launch or small boat, sometimes along rivers which heretofore have been inaccessible owing to shallow water. The house-boat had sides of cheese cloth and copper screen to keep out mosquitoes

the wiping out of the lowland forests by submergence, the rise of new aquatic flora such as the water hyacinth, and the probable inhabitation of the lake by water birds. Such were some of the items in the purpose of the expedition and we were equipped to take advantage of these new conditions if the foregoing assumptions proved correct.

As Gatún Lake was the center of in-

the launch could make but slow time pulling her. Late afternoon of March 6 saw us leaving Gatún with the house boat and by three o'clock the next morning we were tied up at the head of a water-way or *trocha* that branched off from the Rio Trinidad. This was our main camp and we hoped to be able to work the undisturbed jungle from here. Unfortunately, a plantation near by, a

young fruit district only recently made accessible by high water, chose this time to burn over some clearings and we found that the smoke materially interfered with our success. Cameras with flash lights and bait were set out in promising spots, lines of traps for mammals were run daily, while the jungle was hunted in hopes of shooting specimens.

It was at this spot that we made the acquaintance of the largest of the Panamanian monkeys, the "black howlers." Frequently their queer booming, roaring, howl echoed through the jungle, a call that carries for long distances. They howl oftenest just before or during a rain storm and the natives thus look upon them as weather prophets. Upon one occasion I stood almost under some trees through which a troop was passing, while the first big preliminary drops of a sudden shower pattered upon the leaves about me. The volume of sound that issued from the black shaggy throats was so great and so suggestive of a large animal, a lion for example, that I found it hard to reconcile myself to the actual facts. I felt a pang of regret at silencing one of the "howlers" but as a specimen was needed I shot one of the foremost and heard him crash through the limbs to the ground. Pangs of a more effective sort were experienced when my native boy and I attempted to retrieve the monkey, for he had fallen underneath a bees' nest the size of a bushel basket and we found the nest too late to avoid it.

Other interesting mammals encountered here were the

pretty squirrel-like marmoset, the short-haired anteater and several species of opossum, while we were continually wondering at the variety of the bird life and the diversity of the bird songs and call-notes. The noisy parrots that shouted in the morning until the jungle rang with their tumult, the grotesque toucans which at times vied with the parrots, the calling of the parrakeets and the peculiar chorus-like calls of the chachalaca, or "wild turkey," produced an impression that must ever be associated with jungle memories. At night mysterious noises were heard from unknown sources and one weird laughing call in particular



The black howler, the largest of the Panamanian monkeys, is looked upon by the natives as a weather prophet, its loud, long and reverberating howl being most frequently heard just preceding a heavy rain



The common method of navigation of small streams by the native Panamanians is by means of the *cayuca* or dugout, which varies in length from eight to thirty-five feet, and is cut from a single tree. These boats are used by the natives for bringing fruit and produce to market and it is a common sight to see them loaded with sugar cane cut in sections eight or ten feet in length



Scene on the Rio Chillbrillo up which trips were made to visit the bat caves. As palms never grow in water, something of the extent of the flooding of this region can be judged

caused conjecture to run rife, there being as many opinions as there were listeners.

Besides the work done on the Rio Trinidad, several long trips by launch were made up the Rio Chagres, one as far up the river as the launch could ascend and two others up the Rio Chilibrillo to some limestone caves for bats. On these trips it was found that the rising waters had ascended far up the river valleys, which in this part of the region have very little fall, making them navigable to launches where formerly it would have been impossible to take a *cayuca* or native dugout. Some of these flooded rivers — rivers by courtesy, for in the States these streams would be called creeks — with their banks densely lined by jungle vegetation which met overhead and dropped long vines and streamers into the waters, were very beautiful.

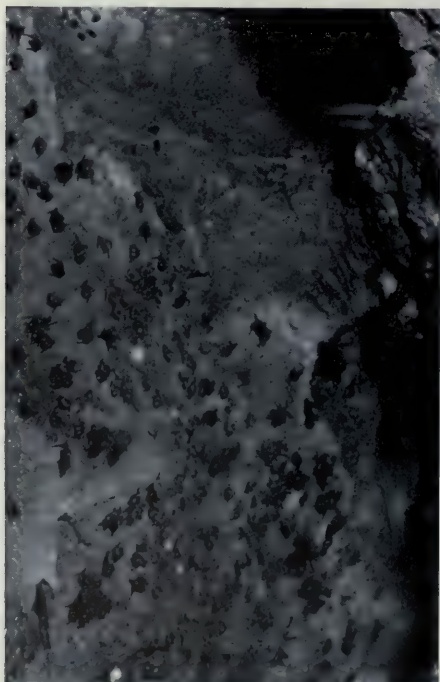
Everywhere we found the forest inundated. In regions early flooded, where the trees were submerged for the greater part of their height, all the trees were dead and leafless with an occasional great clump of orchids, the only green left. Many square miles of the surface of Gatún Lake are thickly studded with dead tree-tops of what was at one time splendid tropical forest. In regions of later high water many of the trees were still green and blossoming; especially was this so along the shores where but the lower part of the tree trunks were under water. It is not improbable that some of the more resistant trees may live to a ripe old age with their roots some feet below the surface of Gatún Lake, for some species were found flourishing among their long since dead companions. No new aquatic growth, arisen to take advantage of the altered conditions, was noted, but the conditions had probably not been in operation

long enough to bring about such a growth. The dead trees are constantly falling and the far-reaching crash of their descent is one of the common sounds of the lake.

Gatún Lake will undoubtedly produce new economic conditions among the natives of the adjacent district. These natives formerly had no other waterways but the few rivers that traversed the interior basin, and were available for navigation only to a limited number of villages. Such rivers were the Chagres, Trinidad and Gatún. Now the far-extending lake shores provide such an accessible waterway that the natives are learning to navigate on lake waters, and every morning their *cayucas* may be seen lined up at the native market along the lock-front at Gatún. Being primarily river boatmen however, they are yet somewhat distrustful of the lake winds and do most of their traveling at night when the winds die down. During the dry season, from January to April, the winds blow across the lake toward a northern quarter of the compass and just the reverse holds true for the rest of the year. This wind at times becomes strong enough to threaten small boats seriously, and at practically all times of the day would be a strong check on the progress of the native dugout that was facing it. We found it necessary to move the house boat always at night and in the early morning hours because of this wind, and this proved a serious obstacle to working many localities, because it was out of the question to run at night without a moon, and when we most wished to move we had a late rising moon. After driving the launch full-tilt over a floating tree and into partially submerged bush and tree tops, trying to steer by lantern light, we confined our future movements to moonlit hours.

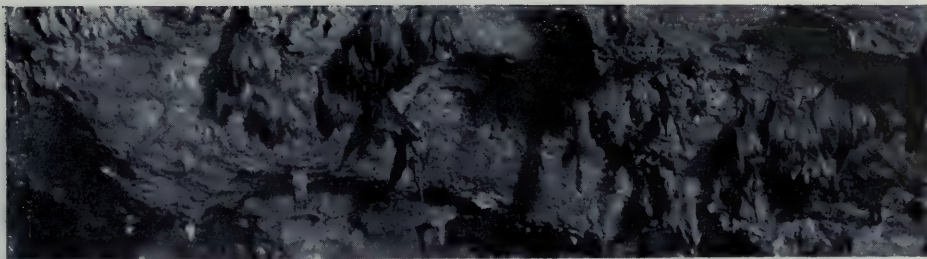


The low entrance to limestone cave on the Chilibrillo River opens into a series of long corridors and chambers more or less intercommunicating



Flash light photograph of bats. They were isolated by species and sexes, each species confined to a particular grotto where it was found in hundreds and the bats of each mass all of the same sex

Whenever one left the waters of Gatún Lake the dense, unaltered jungle was at once encountered and no matter how much its beauty was to be admired from the boat, its impenetrability was no less to be deplored. It was useless to attempt to leave the trail without recourse to the *machete*, the long brush knife of Latin America, and many were the varieties of briars and thorns to be avoided. Once into the thick growth of the jungle, the hunter found it necessary to stand minutes in one spot in order to look into all the arboreal nooks and crannies, so many were the possibilities, so many the great orchid-covered limbs and wide branching trees, and so loath to move the denizens of the jungle. The orchids and epiphytic air plants were very abundant and became so heavy a burden at times as to break down the limb or even the entire tree that harbored them, and not infrequently I witnessed the downfall of some tree overburdened in this manner, once in-



Photograph by George Shiras, 3d

Flash light of small cluster of bats before alarmed. Clusters are ordinarily formed of a great number of individuals, probably several hundred in some instances. The variety shown is one of the largest of South American bats, one specimen secured having a wing expanse of twenty-six inches. The bats are strong and muscular and always ready to bite. The masses of bats bear a close resemblance in form to the stalactites with which the walls and domed ceilings are covered

deed warned by a premonitory cracking, I was forced to move with considerable speed to escape a flying limb.

Mosquitoes, the former bane of early Canal days, were found but sparingly. Even outside the district of government patrol we were bothered but little by them, although we were told that later, during the rainy season, they were much worse. A few spots were encountered where mosquitoes were bothersome, thus arguing a local distribution. The ticks and red bugs however made up in diligence for any slights we might feel we had suffered from not being met by mosquitoes. The jungle everywhere seemed to harbor these pests and they did all they could to make life miserable for us. Ants also were found in abundance and it was fortunate indeed that our camp was a floating one and thus cut

off from inroads of these nuisances. One species of ant in particular will be long remembered by two members of the party, for it stung with a venomous



In a bat cave. Showing method of photographing bats by flash light. As the flash-light powder used is exceedingly explosive the expression of apprehension on the face of the operator is not to be wondered at

vigor never equalled by any bee and made the victim imagine he had been struck by a snake at least.

Concentration of animal life had taken place at the rising of Gatún Lake, and most of the islands formed had many inhabitants at first. The Gatún Hunt Club however soon reduced the population of these islands by hunting them with hounds and as the quarry in most instances could not leave the island the result was a clean sweep of all the larger species. We were too late, consequently, to find abundant game on any of the islands near Gatún. I accompanied this Hunt Club on one occasion, securing two peccaries.

The most efficient method of hunting the Panamanian jungle was by means of a headlight at night. The rays of the

light, worn on the hunter's head, are reflected by the eyes of the animal which shine like two orbs of fire—red, green or bluish depending on the animal "shone." The hunted animal will see nothing but the approaching light and falls an easy victim to the rifle or shotgun. On account of the danger to domestic stock and to people by promiscuous shooting at night, this method has been prohibited on the Zone but beyond Zone limits it is to-day the favorite mode.

The trip resulted in a good series of flash-light photographs of opossums and some of the smaller mammals. The apparatus for "flashing" the animals was set out by some runway or water-course where animals were apt to pass, and consisted of a mechanism to fire a magnesium flash and at the same time



Photograph by George Shiras, 3d

Flash-light picture of paca (*Agouti paca virgata*), one of the largest of the existing rodents, the closely-related carybara alone exceeding it in size. The paca is an animal of nocturnal habits and therefore can be photographed only by means of flash-light apparatus set at night. Note in the animal's mouth the mango which was used as bait. This is one of the game animals of the natives who call it *conejo pintado* or spotted "rabbit"

trip the shutter of the camera which was fastened in a manner to command the trail. A thread attached to a bait and stretched out before the camera, fired the flash when the animal pulled it.

Series of the rodents and the smaller mammals were secured for the Museum collections and for the most part are of species not hitherto represented. The time was too limited to secure many of the larger mammals which are found in the Zone.

The expedition was greatly helped by assistance from the Canal Commission. Colonel Goethals issued special permits allowing collections to be made and at every turn we were assured the coöperation of the Zone authorities. Aside from the help received through official channels the members of the expedition were tendered assistance by the



Photograph by George Shiras, 3d

Flash-light photograph of one of several varieties of opossums encountered in the Canal Zone. The particular opossum shown is the commonest species and by reason of its abundance and its omnivorous appetite, it proved a serious obstacle to flash-light photography. Probably seventy-five per cent of the flashes fired were sprung by opossums who found and fired the camera shortly after dusk before better game was moving

residents. They found such a friendly spirit that many of the inconveniences of foreign travel disappeared, and it was with genuine regret that we left that bit of the States transplanted into Panama and known as the Canal Zone.



Lake end of Gatún locks looking out over Gatún Lake. Three different stages in filling the locks are shown, the lock at the left being empty, the one in the lower right-hand corner half full and the one in the upper right hand corner full. Emergency dams are seen in the background. Four locomotives similar to the one shown are to be used for each ship, two being in front and two in the rear



COPPER QUEEN MINE MODEL

The work was financed and supervised by Dr. James Douglas and directed by Dr. E. O. Hovey. Horizontal and vertical scale of model, one inch equals twenty-four feet. The men (Mr. Briesemeister is at the right above) are installing the buildings, finishing the surface and lining the geological formations

THE COPPER QUEEN MINE MODEL

By Edmund Otis Hovey

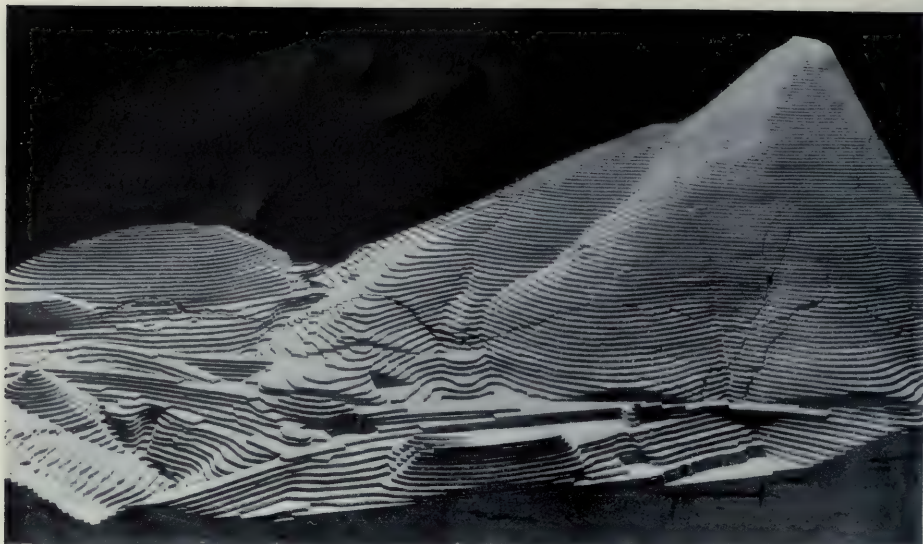
EARLY in 1910, Professor James Douglas of New York City, notified the authorities of the American Museum of Natural History that he was prepared to furnish the data and the means necessary for the construction of a large scale model of the Copper Queen Consolidated Mining Company's property at Bisbee, Arizona, along lines which have proved so successful and popular in the Museum in representation of birds in their habitats.

Accordingly in August of that year, the writer started for the Southwest, taking with him Arthur Briesemeister, a thoroughly trained and successful map-maker, William B. Peters, a preparator of long experience connected with the department of preparation of the Museum, and Thomas Lunt, the Museum's official photographer. Soon after arriving at Bisbee the party, under the leadership of E. F. Pelton, chief engineer of the Copper Queen Company, went into the field and determined upon the point of view from which the picture of the model as a whole with its proposed painted background should be obtained. In the model to-day practically the same view is spread before a person who stands in the middle of the platform in front of the model.

A scale of twenty-four feet to the inch had been decided upon for the reproduction, hence it was necessary to go into great detail in making photographic and other notes and in drawing base maps. The Company had a map on the scale of eighty feet to the inch with twenty-foot contours. Taking this as a foundation, Mr. Briesemeister corrected and brought up to date, roads, buildings and contours, intercalated five-foot contours and noted rock ledges and other peculiarities of the

surface. Record was made of the color of paint on each building, the nature of the material used in construction, the shape and character of the roof, the position and nature of vines, shrubs and trees, and in fact all other features that would be useful in making a naturalistic reproduction of the region determined upon as the portion to be represented. This area is *L*-shaped, the back of the *L* being curved, with extreme dimensions of 18 feet 6 inches by 11 feet 2 inches, representing an area 5315 feet long by 3418 feet wide. Numerous color sketches were made by Mr. Peters and plants were collected by him, all of which have been useful in getting the surface features to look natural. Oil sketches made by Mr. Lunt together with photographs made by Mr. Lunt and myself, were used by Bruce Horsfall, the nature artist, in painting the background.

After spending several weeks in the field, the party returned one by one to New York and in February, 1911, the active construction of the model was begun. The map sheets were enlarged to the required scale and all the detail entered upon them. Wooden boards $\frac{5}{24}$ of an inch thick, representing the distance between two consecutive five-foot contours were cut according to the contours and built up on sectional foundations, there being six sections in all in the model. The exposed edges of these boards, therefore, corresponded to the contours of the enlarged map. Then the surface was modeled on in clay by Mr. Briesemeister, assisted by his son, William Briesemeister, utilizing the photographs constantly in making the surface approach nature in its appearance. After the clay surface was finished J. C. Bell, the Museum's

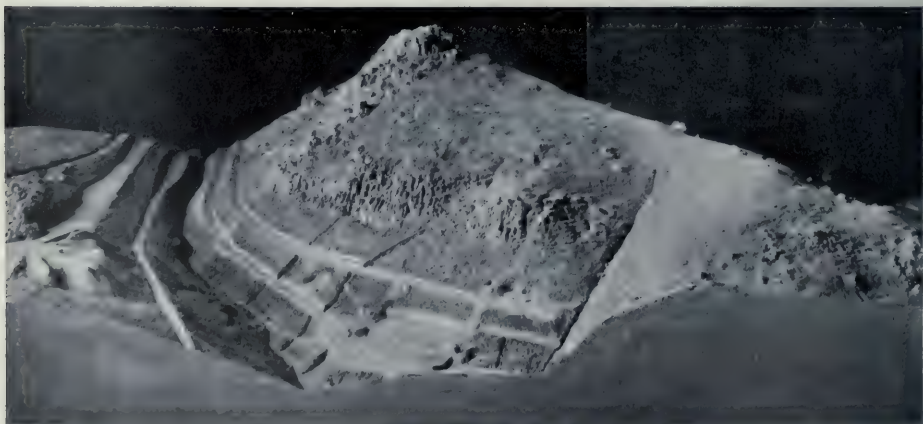


Copper Queen Mine model. Wooden core of one section of the Copper Queen Mine model. It was built up of boards $\frac{5}{24}$ of an inch thick, the exposed edge of each representing a five-foot contour of the map

plaster-worker, made piece molds and plaster copies of the sections, one set of which was sent out to the Company at Bisbee for the use of the engineering and geological departments of the mine.

The construction of the head frames, shaft houses, loading bins, dwelling houses and other buildings within the area represented was no small task, inasmuch as there were several hundred of

them to be made. After experimenting with wood, plaster and other materials, we finally made the metal buildings, which are corrugated iron in the field, out of brass covered with thin sheet zinc scored to scale to represent the corrugations, while the dwelling houses and other small structures were made of cardboard. The head frames, loading bins, railroad tracks, locomotives, cars



One section of Copper Queen Mine model, showing the surface of clay modeled upon the wooden core. It is ready for making the mold from which to cast the final surface in plaster

and the like, are made of brass. The cardboard houses were made by H. Bierce; the metal work was done by Frank O. Crich. Cutting the contours and building the wooden portion of the model was done by Mr. Briesemeister aided by Andrew Latzko and Prentice B. Hill.

When the model was originally projected, the plan was to represent only the surface with a painted background showing the surrounding mountains, but there became evident as soon as work was actively begun, the desirability of representing the underground workings of the mine too, as fully as might be practicable. It was decided furthermore, to build a working model of a single stope on a scale of six feet to the inch to represent details that could not be indicated on the big model.

The representation of the underground portion on the large model was a matter of serious difficulty and led to the making of several experiments. Finally it was decided to excavate the under portion of the model and to put into the hollows thus formed, reproductions of the stopes in solid wood cut according to the detailed plans of the levels as furnished by the engineers of the Company. Tunnels, raises, winzes and shafts were likewise constructed to scale according to these plans and inserted in their proper places, the result being a very satisfactory representation of the stoped-out ore bodies lying between the Czar and the Lowell shafts, which are a mile apart. No effort whatever has been made to represent or even to indicate the position of ore bodies which have not been exploited. In sawing out and building up these stope models, Mr. Hill's practical knowledge gained through several years' work underground as a miner in the Southwest has been of great value. The sides of the model

have been used to give the geological sections along several vertical planes from 4100 feet above the sea up to 5900 feet on the Queen Hill, according to data furnished by Arthur Notman and Max Roesler, the geologists of the company.

The large-scale stope model is based upon data derived mostly from the Gardner Mine, the distance from surface to stope and from stope to main shaft being lessened and the position of the waste dump and loading bin with reference to the head frame being changed to meet the requirements of our limited space, but the square sets, man ways, ore sheets, tunnels, shaft and machinery have been built to scale from the plans of the actual work and photographs. The engine, however, is driven by an electric motor with automatic reverse, cunningly devised by Mr. Crich, concealed underneath the shaft house.

All the work was done in the Museum under my immediate direction, with assistance and advice in supervision from Dr. James Douglas and the engineers and geologists of the company during the progress of the work. Furthermore we utilized to the full the results of Frederick L. Ransome's exhaustive study of the region as published in the *Bisbee Folio* (No. 112) and *Professional Paper* No. 21, issued by the United States Geological Survey. The model represents the region as it was in August and September, 1910, it being impracticable to keep pace in the model with the changes constantly being made at an active mine.

The present property of the Copper Queen Consolidated Mining Company consists of 194 claims, covering about 21,350 acres of land. The rocks in which the ores of copper occur at Bisbee are Palæozoic limestones and sandstones, which have been much disturbed and faulted and have been penetrated in

places by dikes and bosses of granite porphyry, an igneous rock. The fault zones and intrusions were probably the channels through which the ore reached the limestones. Subsequent to their deposition, these zones and adjacent rocks have been altered and converted into masses of highly ferruginous and mangiferous clays and other products, locally known as "ledge matter," within which the profitable ores have been redeposited by a process of natural concentration as secondary oxydized (malachite, azurite, cuprite) and secondary sulphide (chalcocite) minerals. This extensive alteration is confined to the carboniferous limestones, but as the model shows, masses of unaltered ore (sulphides) have been met with, imbedded in the Devonian and even in the Cambrian strata.

The ore is raised to the surface through one central shaft, the Sacramento, though access to the different sections of the mine is obtained through six subsidiary shafts, four of which are shown in the model: the Holbrook, Spray, Gardner and Lowell. The mine is opened by fifteen levels one hundred feet apart vertically, the ore bodies between the various levels being reached by upraises, or by descending passages called winzes. As the ore is extracted, the exposed ground must be supported by timbers and the vacant space filled with waste rock to insure safety. The ore as extracted is thrown down to the next lower level through chutes, from which it is transported in small cars drawn by electric locomotives to the central shaft.

From the Sacramento shaft the ore is dumped onto a belt-conveyor which distributes it into waiting trains of railroad cars. This operation mixes the ores from different stopes to some extent. The trains take the ore to Douglas, Arizona, twenty miles away where

the great smelter is located. There the ore is dumped into long pits or "beds" between the railroad tracks, further mixing of the material being accomplished during this operation. Hither, are brought also sulphide ores as concentrates from the mines at Nacozari, Sonora, Mexico, for admixture with the Bisbee ores, which are too largely carbonates and oxides for economical smelting by themselves. Steam shovels transfer the mixed ores from the beds to cars for the final journey to the smelter, where together with the proper amounts of coke and limestone they go into the blast furnaces and thence into the converters. The copper ingots which result from this treatment are brought to New York to be refined, the final products being pure copper and considerable quantities of silver and gold.

The first claim actively worked was the Copper Queen, on which operations were begun in the summer of 1880 by the Copper Queen Mining Company. In the following year, exploration was begun in the neighboring claims by the Atlanta Mining Company. In 1885, the two companies consolidated as the Copper Queen Consolidated Mining Company. Subsequently, the properties of the Holbrook and Cave Mining Company, the Neptune Mining Company and the Lowell and Arizona Mining Company were acquired and other claims bought.

From the time when mining was begun in 1880 up to the end of the year 1912, there were extracted from these mines 7,729,922 tons of ore of an average copper content of 7.16 per cent. The metal production in this period was as follows: copper, 1,106,605,774 pounds (553,303 tons); gold, 104,775 ounces Troy (8,731 pounds); silver, 6,107,421 ounces Troy (508,952 pounds).



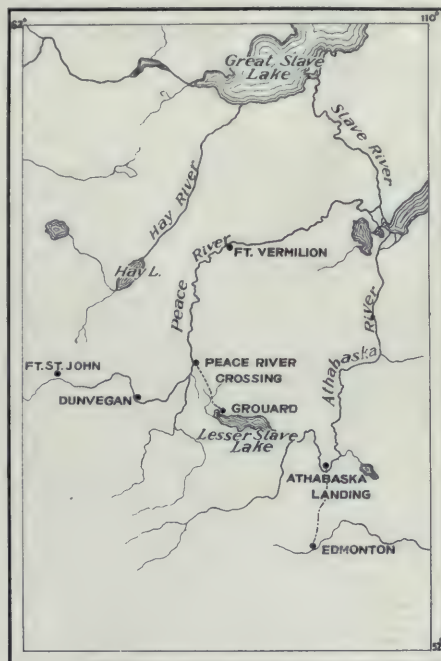
View north from the high banks of the Peace River at Fort St. John, showing the islands at a stage of low water in the river. In three hundred miles there are some two hundred islands wooded with spruce and pine

ALONG PEACE RIVER

By Pliny E. Goddard

THE Peace River was first brought to the notice of the world by Alexander Mackenzie. Not satisfied with following to the Arctic Ocean the river which bears his name, he went up the Peace River, crossed the Rocky Mountains and made his way to the Pacific Ocean which he reached in September, 1793. The previous winter he had spent at Fort MacLeod, built for his convenience and afterwards continued as a trading post. Fort MacLeod is located on the north side of Peace River six miles above Peace River Crossing and nearly opposite the mouth of Smoky River. From that time until 1879 trade goods were brought to Fort MacLeod from Montreal or York Factory on Hudson Bay in canoes or York boats. In 1878 however, a road was cut from Lesser Slave Lake to Peace River Crossing, a distance of ninety miles, and the trade route was changed. The goods were taken up the north branch of the Saskatchewan River on steamers to

Edmonton, then by Red River carts drawn by oxen to Athabasca Landing,



The Museum expedition visited Ft. Vermilion, then proceeded upstream to Ft. St. John, before returning to Edmonton en route for the East



One of the many islands of the Peace River, heavily wooded with spruce which the Dominion Government does not allow cut. The river was liquid mud carrying driftwood and logs

Edmonton and from there by York boats and carts to the Peace.

Regardless of the route and means of transportation, the trading customs remained unchanged. Each fall the trading post supplied the Indians with powder, shot and balls, traps, tea and tobacco. These were usually given on credit, or as they still say in the North, "in debt." When winter set in, the

Indians went out to their trapping grounds. The man of the family established a line of traps and snares fifteen or twenty miles long and went back and forth over this line throughout the winter. When he found a beaver house he chiseled through it, having first made an enclosure so the beaver could not escape. The skins obtained in this way were brought to the trading post in

the spring. On arrival, the Indian received a present of tea and tobacco and in later years, flour. When he began trading, his "debt" was first covered, then he bought provisions, calicoes, blankets, and whatever his heart desired. All trading was done on a basis of "made beaver," a mere term used in trade and indicating at the present time on the Peace River an arbitrary value of thirty-three and a third cents. During the summer it was easy to live on the rabbits caught in snares by the women. One



Hudson's Bay steamer making a landing at Fort St. John. It carries settlers' freight as well as provisions for the various posts and brings back furs

or two moose hunts supplied a quantity of more nourishing food, some of which was put aside for winter.

So the years passed until the empty stomachs of Europe cried for more wheat. When the easily plowed and more accessible lands of Manitoba and Saskatchewan had been sparsely settled and pioneers had moved on to Grand Prairie, south of Peace River, Edmonton with its railroad became the commercial center of a vast region and rapidly grew from a trading post to a flourishing city. At the present time the railroads following the tracks of the old carts will soon reach the Peace.

It was with keen disappointment that the windows of the real estate dealers in Edmonton were viewed last summer. According to them Dunvegan, one of the earlier trading posts, had already become a city with many streets and buildings; Peace River Crossing was a flourishing town. All this brought visions of a region crowded with incoming settlers.

Gradually however, as the journey was pursued, the feeling of disappointment gave way. To be sure, the journey from Edmonton to Athabasca Landing was made on the train, but the slow speed and long stops on the sidings gave ample opportunity for observing the country. The evening of that day and all the following day were spent on what seemed then a *small* flat-bottomed river steamer, heavily loaded with freight. We slowly and painfully made our way against a stiff current up the Athabasca River between its well-wooded banks, and saw no

signs of civilization. The second night brought us to the mouth of Lesser Slave River where a town had just had its birth. There were a few poolrooms, half a dozen houses and many tents. After a half-day of bad roads and uncomfortable riding, we found a really small river steamer waiting for us.

The river was narrow and winding with banks about level with the upper deck. There was again no appearance of civilization. Muskrats were seen swimming in clear water and flowers grew on the banks almost within reach. There followed a day of rain on a wide lake where land was not to be seen — on such a day at least. That night when we reached the new town of Grouard came the first and almost the only blot on our enjoyment of the trip. A long sandy street was lined with new buildings. No doubt there were good-hearted, normal human beings there, but those in evidence were aggressive and grasping. It was painful to learn that the most disliked examples were Americans who probably had moved on to Grouard because they were not wanted at home.

Two and a half days spent on a wagon seat watching drizzling rain and clouds of mosquitoes, brought us through the



Protection at night from mosquitoes in the North. Muslin is used at the top to give strength, and cheese-cloth around the sides



Camp of Dunvegan band of Beaver Indians. Here can be seen the last stages of the hunting life, which is now giving way to agriculture because of the inroads of white civilization

ninety miles of small poplar timber along the trade road from Lesser Slave Lake to Peace River Crossing. Really the time should have been filled with thanksgiving, for it was the last speedy and not too uncomfortable trip to be made across this same portage for several months. Peace River Crossing did show signs of growth. But that "was n't too bad" as they say in the North. Undoubtedly the best part of it was that the "Grenfell," the little river boat that was to take us downstream, had steam up and dinner cooked when we arrived. About two that afternoon we crossed the Peace and took on several cords of wood.

With a whistle to jeer at the Company's boat which had expected to pull out before us and did not, we moved downstream.

The little "Grenfell" could make about fourteen miles, and the river itself was making eight because the water was very high. It was liquid mud carrying driftwood and logs — even whole trees. The sun slowly moved from south to west, from west to northwest, and then was hidden behind the river banks. That it had set we could not be certain for there was plenty of light until about eleven o'clock when we tied up to the banks so the engineer could sleep.



Fort Vermilion trading post of the Hudson's Bay Company, said to be the best stocked post in the North. Here a grist mill was maintained which also for many years furnished power for electric lights



Revillon Frères' trading post on Hay River, which is more than seven hundred miles by any available route from the railroad. Fires are kept burning to protect the horses from flies

The river is full of islands. In the three hundred miles there are about two hundred of them, covered with pine and spruce timber. As we proceeded the banks gradually grew lower and the river wider. That night we tied up at North Vermilion and went down to the river bank instead of up, the river was so high. Here six hundred miles from the railroad there are two little communities of whites and half breeds, one on either side of the river. They get mail once a month and are glad to get it, although it is usually two months old when it arrives.

The white people are well-read, well-educated, and have the true northern hospitality. The half-breeds form a class by themselves. They read a little French, but prayer books and catechisms are all that are available to them in French. Only a few of them have been as far from home as Edmonton, the others consider Vermilion the center of the earth.

With Vermilion as a base six weeks were spent in ethnological work. During this time a trip was made to a trading post on Hay River on the occasion of



Slavey Indians gathered to receive treaty money from the Dominion Government. An annual payment of five dollars for each Indian is made to heads of families in an effort to keep an accurate census and supervision over the tribes. Some refuse to accept the money and none have any conception of the outside world



Slavey Indians showing type of face common to the northern tribes. These Indians are generally rather light in color and are thoroughly primitive in manners and customs, although they have adopted white man's dress



The Indians of the north honor a person of importance by making a lob-stick. The one shown in the picture was made by Cree boatmen

"treaty paying". Nearly all the Indians of Canada receive cash payments from the Dominion Government once a year. A band of Slavey Indians, practically untouched by civilization except as to dress, trade at this post which is seven hundred miles from the railroad by the usual route of travel. The Beaver Indians who hunt between Hay River and the Peace are greatly reduced in numbers and considerably influenced by more than a century of contact with white and half-breed traders and servants of the fur company. A fair collection was made among them, and information secured which, although scanty was very acceptable.

Returning upstream from Vermilion to St. John in August was another matter as regards speed. The current was not quite so strong, but the steamer belonged to the Hudson's Bay Company. The ways of the Company are still the old ways in the North. There must be a French-Cree word for *mañana* since the thing itself certainly exists. The boat was comfortable however, the weather perfect, and the companionship excellent. On that particular trip of the steamer there was on board a fine old Catholic bishop who had been a pioneer in the North, two sisters of charity, a Church of England missionary, a judge, two or more lawyers, superintendents of

trading companies, politicians and several surveyors. It took three weeks to reach Fort St. John where from the river banks, nine hundred feet high, the Rocky Mountains are to be seen. The first of civilization in the persons of several young settlers went to St. John with us.

Here also are remnants of once powerful Beaver tribes who in early days burned the trading post and killed the traders. As treaty had been paid considerably in advance of the advertised date the Indians were nearly all far back from the river securing food for the winter.

A week's stay was made at Dunvegan, some miles from which place a band of Beaver live on the reserve. Near them were several prosperous agricultural settlements. Dunvegan itself had not as yet responded to the efforts of the real estate agents at Edmonton. Its white population varies from three to five depending upon the movements of the mail-carriers.

Coming back to Peace River Crossing was pleasant and should have been easy. If one sits down on a raft or in a canoe and sits still he will quietly pass the two hundred and forty miles from St. John to Peace River Crossing. Our luck was a canoe loaned to us. Because it was the homeward journey the natural speed of the current, three miles, was increased to five or six by the use of the paddles. It is tiresome work, but a few days of it puts a large share of conceit into one when he tries his muscles against a loafer. Yes, there were bears, there always are on the Peace. This

was the time of ripe berries and there were many bears. We know that they, Indian-like, must have "made medicine" against us, for nothing else could have prevented our killing one.

We were very happy when Sunday night at eleven o'clock, two hours after



Alexander Mackenzie, a descendant of the original Alexander Mackenzie, explorer and discoverer of the river which bears his name. Mr. Mackenzie is standing on the site of Fort MacLeod where the earlier Mackenzie spent his first winter on the Peace River before starting out for the Pacific.

darkness had come in the early days of September, we paddled our canoe alongside the Company's boat "Peace River."



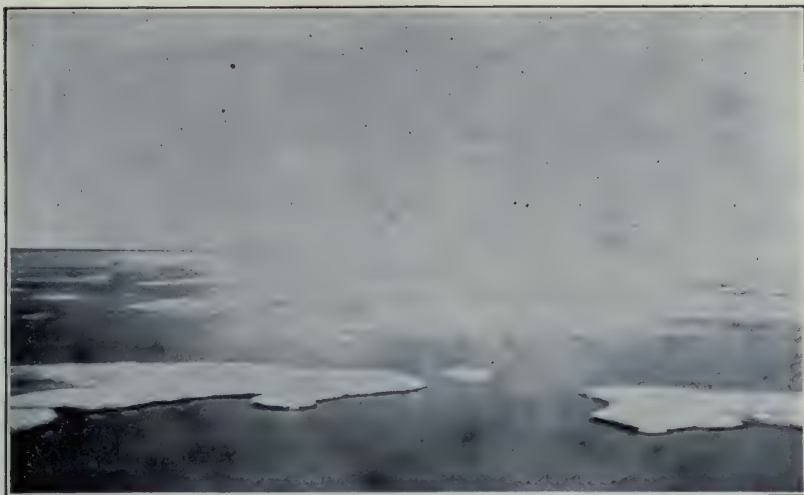
This photograph shows how the banks of Canada follow closely upon the entrance of civilization



Hudson's Bay Company's boat "Athabaska River" — which the opposition boat its about to pass after three hours' racing

Kind friends helped us unload. A cheery fire in the salon, a cup of tea, and welcoming smiles soon drove out the cold and stiffness accumulated since five in the morning. This was at the end of the telegraph line and the beginning of civilization which curiously enough was truly welcome.

Will the North pass as our West has passed? Even when the Peace River is settled as it soon will be, there will remain a vast fur-bearing region, but that the peculiar types of white people and Indians with their present customs and manners can long survive is a question, and they make the real North.



Water on top of solid sea ice in June

"MY LIFE WITH THE ESKIMO"

REVIEW OF A RECENT BOOK¹ BY VILHJÁLMUR STEFÁNSSON, LEADER 'OF
THE CANADIAN ARCTIC EXPEDITION

By Herbert L. Bridgman

RARELY if ever has the dramatic element colored and dominated expeditions, as it has Stefánsson's. "Blonde Eskimo," though only an incident and a comparatively minor one, of four years of hard, faithful work, caught the popular fancy the world over, and now after weary months of waiting the certainty that the "Karluk" carrying the northern party of the expedition, is lost and a third of her party missing, is succeeded by deeper and darker mystery as to the fate of the expedition's leader with his two companions. Those who have known Stefánsson longest and best do not give up hope, but the little party adrift in open Arctic pack must be in desperate chance either of gaining

Banks Land or of subsisting for any considerable time.

But no matter what may be the solution of the mystery haunting and enveloping the expedition of 1913, it but heightens and intensifies the interest with which one reads *My Life with the Eskimo*, a comely volume of compelling interest and that essential charm which personal, truth narratives, well told, always command. That Stefánsson's project to "live off the country," practically alone, was daring and original, as well as the core of practical common sense no one can now deny. Much of the success which he achieved was, however, due to him, rather than to his theory. A man less tenacious and resourceful, under circumstances exactly like those which confronted Stefánsson might have made total wreck of his undertaking and perished into the bargain. Contrast the

¹MY LIFE WITH THE ESKIMO. Vilhjálmur Stefánsson. 8vo., 538 pages. Illustrated with 60 halftone plates from photographs by the Author. New York: The Macmillan Company, 1913.



*From My Life with the Eskimo, through
courtesy of the Macmillan Company*

SEA ICE SHOWING HIGH PRESSURE RIDGE TO BE CROSSED

The heavy bulky load of ethnological specimens for the Museum, made progress difficult, and very often the axe had to be used for road-making



*From My Life with the Eskimo, through
courtesy of the Macmillan Company*

SEARCHING FOR ARCHAEOLOGICAL SPECIMENS AT CAPE SMYTHE

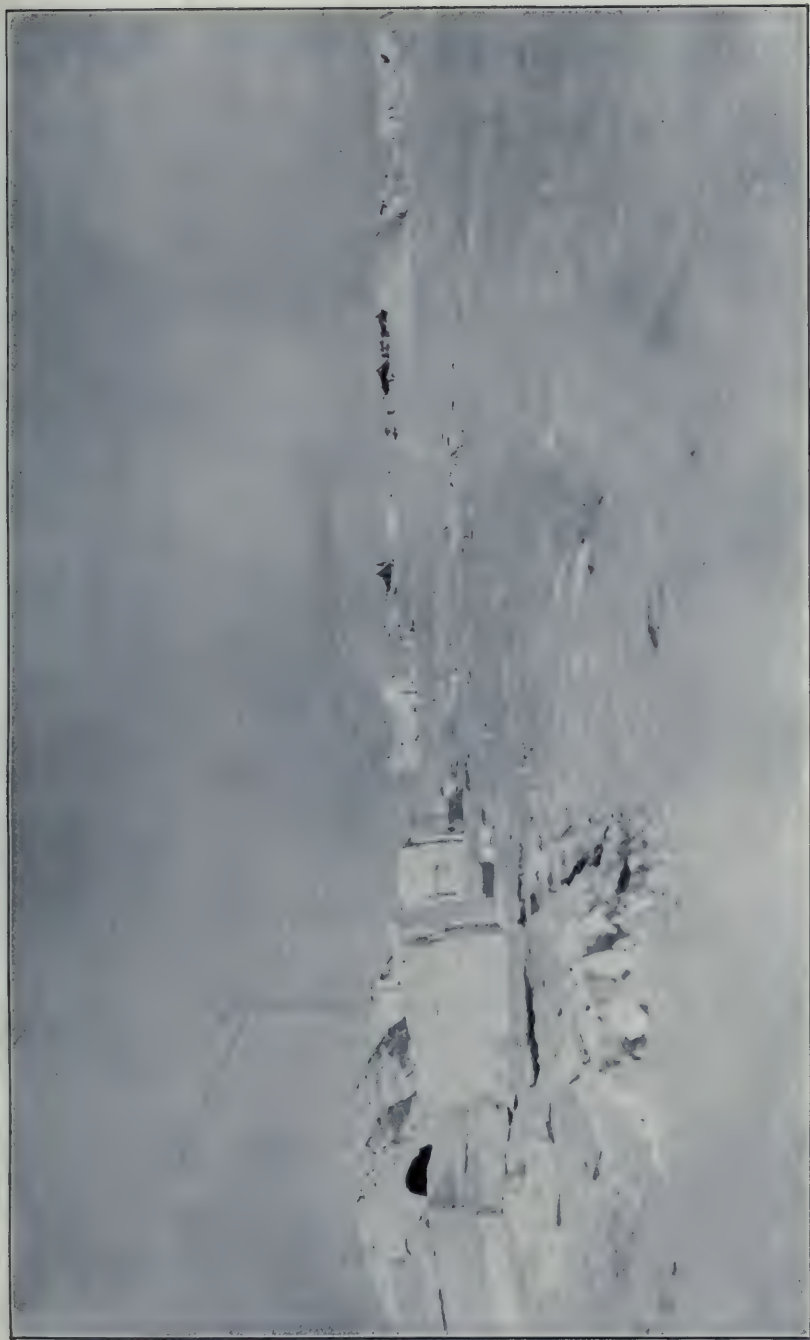
Excavations in the house ruins and kitchen middens yielded some 20,000 specimens (now among the valuable possessions of the Museum) which throw much new light on the life of the Eskimo in prehistoric times



*From My Life with the Eskimo, through
courtesy of the Macmillan Company*

PRINCE ALBERT SOUND GROUP OF ESKIMO

These and many other Victoria Island Eskimo suggest Europeans not only in blond characteristics which no full-blooded Eskimo should have, but also in the form of the skull as proved by the many head measurements taken. It is suggested as a possibility that the "Blond Eskimo" may be descendants of the Scandinavian colonists of Greenland



*From My Life with the Eskimo, through
courtesy of the Macmillan Company*

ESKIMO VILLAGE OF TWENTY-SEVEN DESERTED AND THREE OCCUPIED HOUSES

This village of Copper Eskimo, and another ten miles away with its twenty-seven houses occupied by the one hundred and fifty Eskimo who had moved on from here, were approximately in the middle of Prince Albert Sound and were the largest villages belonging to a single tribe discovered. From the people (the Kanghiryuarmiut) of these villages a complete collection of clothing, hunting implements and other ethnological specimens was purchased for the American Museum

single white hunter cutting loose from his base, burning his bridges behind him, striking out with only rifle, sledge and two Eskimo, into the unknown East, ignorant whether he should find the missing tribes he sought or the game on which life depended, with the same man commanding fifty men and a squadron of three ships under the Canadian flag, and one gets a sense of the difference in exploration methods and the different ways by which men go about what looks like pretty much the same thing.

More than these rare enough qualities though, Stefánsson, as the reader of *My Life with the Eskimo* will quickly learn, has others not less notable. He not only can make history, he tells it with frankness, simplicity and naïvete which make reading a pleasure and carry one, as with actors in a play or characters in romance. He makes light of hardships, hard places and hard luck and whether without matches or food, appears to count it as all in the game and never grumbles nor bewails his luck.

As a contribution of sub-Arctic ethnology and archæology, although written in familiar terms for the reading of everybody, the book adds a store to knowledge, while when it comes to dealing with purely scientific and technical values, no authority is as competent and impartial as Stefánsson. He takes nothing for granted, not many things, even himself seriously, and weighs all theories and hypotheses in the light of actual facts and positive evidence. He does not attempt to decide where the blonde Es-

kimo came from. He tells what he saw and learned and reserves his decision until he is certain that he has gathered all the evidence.

In like manner the two chapters, supplemental to the narrative, upon the religion of the Eskimo and conversion of the heathen, are a most illuminating assemblage of actual facts, upon which Stefánsson ventures no dogmatic opinion, although it is easy to detect between the lines what he really thinks.

Dr. R. M. Anderson's hundred pages on the geology, plants, trees, fishes and mammals of the Northwestern Arctic are valuable and instructive, cut down to lowest and scientific terms, and his presence with his former leader and comrade with the Canadian Arctic expedition gives promise of thorough study and large accessions of knowledge concerning a rapidly disappearing fauna. Maps and indexes are hardly as complete and copious as would be desired and the haste of Stefánsson's departure to which the publishers refer, is emphasized by the lack of a table of contents and an introduction, for which the first chapter will serve as a tolerable substitute.

My Life with the Eskimo must make multitudes of readers and friends everywhere, who will await with eagerness the news, as it shall come at infrequent and irregular intervals, of the absent expedition, until it brings to us the chapters yet to be written concerning the distribution and the past, present and future of these quaint interesting Eskimo tribes of our common human family.

SHELL COLLECTION IN THE AMERICAN MUSEUM

By L. P. Gratacap

PERHAPS no department of zoölogy exceeds conchology in appeal to the imagination and to the intellect. Shells are among the earliest evidences of life upon our globe and their preservation in the older rocks surpasses in its intelligibility that of any other order of organisms, while in the world around us they inhabit the land and the sea with a universality of diffusion that is preëminent.

Their formal contrasts are also remarkable. Grouped to-day under Mollusca, the zoölogist contemplates an assemblage of animals which in their divergent aspects at either end of the series brings him in contact with the extraordinary calamaries, squids and cuttlefish and with the graceful, delicately colored and fragile nudibranchs. No systematic division of the kingdom of living things perhaps offers so apparently heterogeneous an association. Let the reader recall to mind those marine monsters of fabled ferocity such as the giant squids, creatures that may have attained a length of fifty feet, a great part of which belonged to their grotesque and powerful arms, then watch—if he is afforded the pleasure—the nereid-like beauty and protean coloration of *Dendronatus* as he may see it on rocky bottoms or in tide pools on the coast of Maine, and then bring together under one collocation these almost irreconcilable elements and he will realize the wonderful contents of this study; all the more too as in neither the squid nor in the sea-slugs is there any showing of a shell. It is indeed not possible to reserve astonishment when we find the bivalve (oyster, clam, mussel), united in the same class with the big whelks (*Strombus*), the colossal tritons and the variegated cowries (*Cypræa*) and also with those singular sluggish patches of many-plated elliptical bodies immovably adherent to rocks, which the fishermen call “coats-of-mail,” and collectors call “chitons,” and which the nomenclatural facility of systematists arranges under the descriptive designation of the Polyplacophora.

Turning to the land the student encounters an innumerable army of molluscan inhabitants which, excepting that they do not fly, fill it at all points, not omitting its lakes and

rivers and which take on in southern climes the most vivid colorations.

The interest of shells however is not at all limited to these contrasts of form or function or to their diversity of ornamentation. By reason of their distribution in time they allow the palæontologist to guide or correct the geologist, while almost more discernibly than any other kind of life, they mark the evolutionary stages of creation, and enable the student of past conditions to determine the geographical and climatic fluctuations of the continents. They notably contribute to the current discussions which engage naturalists as to centers of radiation, convergence, or parallelism of growth, survival, selection, migration, variation, rudimentary organs, environment, acceleration and heterostylism, and while they may lack what might be called a muscularity of demonstration, their evidence perhaps is more conclusive if more subtle, than that derived from the mammals or the birds or the reptiles.

The shell collection now opened to the public, after three years of seclusion, by no means illustrates all the claims made above. It is primarily a collection of living shells and the shadowy extension of the class backward to the first dawn of life is scarcely hinted at. Nor at present has it been made illustrative of the ecological problems which exercise so much fascination for investigators, problems of where and how and why. In the condition in which the visitor will find it, it is a fairly representative collection of marine, fresh-water and land shells, and only in the synoptical series on the south wall, is any intimation gleaned of the existence of molluscs which have no shell, such as the squids and nudibranchs. But the collection is not on that account deprived of interest or charm, indeed a too preponderant invasion of fossil shells would prove deterrent to the average visitor and the shell-less molluscs could only secure representation, as they do, in alcoholic specimens or by models.

The apportionment of parts in the hall is quickly explained. The flat table cases at the north and south ends contain land shells, with a representation of brackish water shells (*Cassidulus*, *Pythia*, *Melampus*) and a few

pond snails (*Limnea*, *Physa*, *Planorbis* etc.); the marine univalves are arranged in the large metallic cases in the east and west corridors, and the bivalves (*Pelecypoda*) occupy the rail cases, while a much contracted, and simply emblematic, synoptical series has been placed in the south wall cases, and especial exhibits, as of abnormalities, ornamental uses, large shells, color or other variation, and the map of molluscan oceanic provinces with representative genera, are installed on the north wall.

Even thus limited the prodigality of the display must prove educational, while in many genera the long suites and the perfection of the shells convey an aesthetic pleasure which many visitors may find helpful for retaining scientific names and position. A hall of shells broadly generalized and controlled by the wisest scientific spirit would make it tributary — let us say — to oceanography, where the populations of the successive benches of the sea margin and the inhabitants of the abyss would be exhibited, while it also defined, in its arrangement, land faunal areas. It is however certain that in such a disposition of the shell collection, systematic study would be much deranged, and so far as permanent impressions of the families and genera of shells are valuable, visitors might lose much. A double exhibition might be so conceived that both the distribution and the kinds of shells in their serial and group arrangements could be harmonized with reciprocal benefits in both divisions from the collocation.

The collection as made up, is a composite one, and encloses, by inference and suggestion as well as by chronological data, an interesting history of early conchological effort. Its nucleus — although like most nuclei overwhelmingly occluded in subsequent growths — was the famous collection of Dr. John C. Jay, and its presentation by Miss Catherine Wolf to the American Museum laid the foundations of the great scientific library now found within its walls. It was practically a purchase of the large Jay library, which brought the Jay collection of shells along with it, that began the present library of the Museum.

The Jay collection of shells is inseparable of course from the stirring memories of the excitement, interest and applause that attended the publication of the Jay catalogue of shells, near the middle of the last century. It was a remarkable work in its

day. It remains a monument to the author's industry. Bibliographic research had hardly in this country covered so large a field before. The work went through four editions and enumerated nearly eleven thousand species, the compilation of its synonymy embracing some 40,000 names. Collecting in those days, as is very well known, did not resume, as to-day, the details of occurrence, and locality data are often vague or illimitable, but the collection was a very notable one and probably in its comprehension of families exceeded in importance any public or private collection at the time.

To this collection has been added, by purchase, the very remarkably beautiful collection of William S. Haines which added not only a long list of species, but increased the individual suites by many notably perfect specimens. The Bickmore collections from the East Indies and Spice Islands, the John Croke collection — a very valuable gift from that gentleman — and the Binney and Bland collection of land shells, with many types and cotypes, together with numerous gifts of smaller lots, none negligible and many important, make up the Museum's present collection.

A late and very important addition of specimens was received from the late Frederick A. Constable, presented before his death. It particularly embraces a really notable assemblage of small shells labelled and many most painstakingly mounted in glass-covered black-edged boxes. The scientific importance of this generous gift cannot be overestimated.

The immediate work to be undertaken in connection with this collection seems rather startling in its demands. The collection must be relabelled in large measure with deference to new or later nomenclatural needs and in some way a systematic study collection must be segregated for daily use. Its gaps should be filled, and especially the molluscan fauna of America — no matter how inclusive or exclusive the term is made — be fully illustrated, while the excursus of more ambitious designs might reasonably extend all of this work into a developmental comparative study of Tertiary and living forms. But obviously, apart from these higher scientific ends, the immediate requisition is an attractive installment, and freshened accessories, whereby the young student, the collector and the more or less observant visitor may be aided, stimulated or instructed.

MUSEUM NOTES

WORD has been received from Messrs. Herbert Lang and James Chapin of the Congo expedition that they arrived safely at Stanleyville on September 30. The collections are in fine condition and in such quantity that the final packing will demand three months. It will be remembered that the expedition set sail more than five years ago under the patronage of the Belgian government and was financed by Messrs. John B. Trevor, Charles Lanier, Cleveland H. Dodge, J. P. Morgan, William K. Vanderbilt, A. D. Juilliard, Robert W. Goellet and William Rockefeller as well as by an appropriation from the Belgian Government. The aims and scope of the expedition and the work accomplished rank it among the greatest that the Museum has ever sent out.

MR. LEO E. MILLER was chosen to lead another expedition to South America and set out during the latter part of October. Mr. Miller has already done valuable scientific work as a member of the Museum's first Colombian expedition in 1911, leader of the second Colombian expedition in 1911 and 1912, leader of the Upper Orinoco expedition in 1913, leader of the British Guiana expedition in 1913 and mammalogist of Colonel Roosevelt's South American expedition in 1913 and 1914, and is thus particularly well equipped for work on that continent. Mr. Miller will have as his assistant, Mr. Howarth Boyle. The expedition is financed in part by Colonel Roosevelt and in fact has come about as an outgrowth of friendly relations which grew up between Mr. Miller and Colonel Roosevelt on the recent South American expedition. The new expedition will proceed directly to Colombia and will go first to the semi-arid region around Barranquilla, then up the Magdalena to Puerto Berrio and across to Medellín, the capital of Antioquia. With Medellín as a base about four months will probably be spent in this region, working out the different life zones from the low tropical forest at Cáceres on the Cauca to the cold paramo of St. Elena. The expedition will then take up work on the west coast of Panama for a few months, will go from there to Chili, and thence overland into the highlands of Bolivia, making Sucre the base of operations. Some months will be spent in this

neighborhood, with possibly a trip to Lake Titicaca. The return will very likely be made by way of the Rio Beni, the Madeira and the Amazon rivers some two years hence.

MR. ALBERT THOMSON continued work in the agate fossil quarry in Nebraska this summer for the department of vertebrate palaeontology. Four skeletons of the great "clawed ungulate" *Moropus* were obtained, which, added to those secured during the last two seasons, will supply a series of specimens such as is seldom available for the study of any extinct mammal. The best of these skeletons will be selected for a mounted group to be placed in the Tertiary mammal hall.

The principal expedition of this department was in charge of Mr. Barnum Brown, to the Cretaceous dinosaur bed of Alberta. The results of this highly successful season's work will be reported in a later number of the JOURNAL.

A PLAN for the extension of the educational work of the Museum, providing for the establishment of local lecture centers in centrally located schools, the inauguration of a system for loaning slides and the opening of a branch teaching and exhibition museum in the Washington Irving High School, has been presented to the Board of Trustees and has received their general approval. President Osborn has appointed a committee consisting of Mr. Felix M. Warburg and Mr. R. Fulton Cutting of the trustees and Mr. George H. Sherwood and Dr. C.-E. A. Winslow of the Museum faculty to consider further the detailed plans for the proposed extension. This project has also received the endorsement of Mr. Thomas W. Churchill, president of the Board of Education of New York City, who has appointed a special committee of the board consisting of Mr. Frank D. Wilsey, chairman, Dr. Ira S. Wile and Mr. Francis P. Cunnion to consider these plans for coöperation between the Board of Education and the Museum. The plans have been approved also by Dr. William H. Maxwell, city superintendent of schools.

DR. ROBERT H. LOWIE spent the summer in ethnological work in Montana and Nevada. He visited the Crow Indians of southeastern Montana from whom he secured a large body

of mythological tales. From the Northern Paiute whom he visited for the first time as a part of the department of anthropology's reconnaissance of the plateau area, he obtained a representative collection of basketry and other objects representative of native culture. One of the most interesting specimens is a boat or *balsa*, more than ten feet in length and made entirely of rushes, for use during the fall duck hunt. A brief visit was paid to the Ute Indians of Utah for the purpose of comparison with the southern Ute of southwestern Colorado, who had been visited some years ago.

SINCE the last issue of the JOURNAL the following persons have become members of the Museum:

Patron, MR. ROBERT FULTON CUTTING;

Life Members, MRS. SIDNEY M. COLGATE, DR. W. S. RAINSFORD, and MESSRS. JAMES BARNES, SAMUEL J. BLOOMINGDALE, S. BAYARD COLGATE, EDWARD D. HARRIS, FREDERICK C. ROWLEY and HENRY ROWLEY;

Annual Members, MRS. JOHN A. MORRIS, MISS R. C. BOARDMAN, DR. LEE M. HURD, and MESSRS. DAVID A. ARONSON, H. E. FENSKE, FRED W. GREEN, ROBERT W. MARTIN, CLYDE MILNE, JAMES ULMANN, and OTTO VON SCHRENK.

OWING to a depletion of funds available for publication of the JOURNAL, the Museum has considered it advisable to combine the October and November numbers in the present issue, to be followed by the December number as usual.

A LETTER recently addressed by President Henry Fairfield Osborn of the American Museum to the President of the Chinese Republic urging that the Chinese Republic preserve its antiquities and products of art, was reprinted by order of the President of the Chinese Republic in a large number of the newspapers of China. This letter and the memorial received from the Asiatic Institute was followed by an edict protecting all monuments of China and finally by an edict from the Chinese President setting aside a large reservation and buildings in the city of Peking for the establishment of a national historical and art museum.

A preliminary report is now in press, of the work of the Stefánsson-Anderson expedition, which spent 1909-12 in ethnological

and zoölogical research for the Museum along the shores of Beaufort Sea and Coronation Gulf in the Arctic. The report was in part prepared by Mr. Stefánsson before his departure on the Canadian Arctic expedition in the summer of 1913 and consists further of extracts taken directly from his field journals. It is made up of 376 pages, with two maps and 94 figures in the text, and will appear in the *Anthropological Papers* published by the Museum.

DR. BRUNO ETTTEKING, who has been assisting in compiling the results of the Jesup North Pacific expedition as regards physical anthropology, has returned from Germany where he has been spending the summer.

THE Museum has recently been honored by a visit from Messrs. R. R. Marett and Sydney Hartland, two eminent English anthropologists who were returning from the meetings of the British Association for the Advancement of Science held in Australia during the summer.

DR. PLINY E. GODDARD spent August and September in ethnological work among the Apache Indians along the Gila and San Carlos rivers in Arizona, and succeeded in securing valuable motion picture films illustrating the industries of the people.

DURING the past summer Dr. Clark Wissler, with the aid of Mr. James R. Murie, an educated and influential member of the Pawnee tribe of Indians, completed various manuscripts descriptive of the societies of the Pawnee.

THE Danish Arctic explorer, Mr. Knud Rasmussen, who showed marked courtesy to the members of the Crocker Land expedition during the past year, has recently had \$75,000 placed at his disposal for the purpose of outfitting a North Pole expedition. The expedition, which will take provisions for two years, will be provided with all modern appliances and will be accompanied by a staff of scientists. The base will be at Cape York, in Greenland.

A LETTER has been received by the Museum from Mr. D. B. Boggild, director of the Mineralogical Museum of the University of Copenhagen, expressing appreciation for the assistance rendered by the members of the Crocker Land party to Mr. Knud Rasmussen.

THE Transantarctic expedition headed by Sir Ernest Shackleton, who was a frequent visitor at the Museum during the outfitting of Mr. Stefánsson's Arctic expedition, left London in September. One section under Sir Ernest Shackleton departed for South America and the other half of the expedition left for Ross Sea on the New Zealand side of the Antarctic, by way of Tasmania. The Ross Sea party will board the exploration ship "Aurora" at Hobart, Tasmania. Sir Ernest Shackleton will leave Buenos Aires by the ship "Endurance." It is expected that the two sections of the expedition will meet by April of next year or failing that, by March, 1916.

MR. H. R. FRANCIS, assistant professor of landscape engineering in the New York State College of Forestry at Syracuse University, made a street tree survey of a section of the Borough of Manhattan during the summer, with an office in the Museum as his headquarters. The work was undertaken by the College of Forestry in coöperation with the Tree Planting Association of New York City. During the winter of 1913-14 a general survey was made of all the Borough of Manhattan and a report was issued by Professor Francis to the Tree Planting Association. The work this summer was to ascertain the conditions in detail of a section of Manhattan that would be typical of the Borough. The survey was made in the portion of Manhattan east of Fifth Avenue between 86th Street and 42nd, east of Sixth Avenue between 40th Street and 14th Street and east of Avenue B between 14th Street and Rivington Street. A large amount of valuable data was obtained which will be used as a basis for an additional report to the Tree Planting Association.

Professor Francis found that there is great need for more intelligent care in the planting and preservation of trees along the streets of Greater New York City. The Park Department under whose supervision the work of this kind has been done since 1902, has never had funds sufficient to care for trees already planted or those planted from time to time by private property owners, nor to plant new trees along streets where trees have died. In the section of the city surveyed by Professor Francis it was found that the trees were dying through lack of care, and opportunities for planting trees had been

neglected for many years. This is particularly true of the section east of Third Avenue where thousands of children have no place to play other than on the streets. What New York City really needs is a Bureau of Tree Culture with a city forester for each borough and the proper support from the city to do the work of planting and preservation of shade trees in an effective way.

DR. FREDERICK W. TRUE, assistant director of the Smithsonian Institution and one of the foremost cetologists of the present time, died in Washington on June 25.

THE American Ornithologists' Union has appointed Dr. J. A. Allen and Dr. Frank M. Chapman of the department of mammalogy and ornithology, with ten other scientists as a committee on classification and nomenclature of North American birds.

DURING the summer a visit was paid to the Museum by Dr. Alexander G. Ruthven and Mr. Frederick M. Gaige, of the Museum of Zoölogy of the University of Michigan, en route to British Guiana, where they will carry on zoölogical field studies.

DR. C.-E. A. WINSLOW has resigned from the College of the City of New York to become director of education in the reorganized State Department of Health. His work at the Museum will continue as heretofore.

DR. HERBERT J. SPINDEN of the department of anthropology returned during the summer from a seven months' archaeological expedition to the Maya ruins of Central America. Dr. Spinden was accompanied by Mr. S. G. Morley, at the time a fellow of the Archaeological Institute of America and now connected with the Carnegie Institution of Washington. Together they visited the principal ruins of southern Yucatan including Naranjo, Tikal, Ixkun, Seibal, Yaxchilan and Piedras Negras and obtained valuable information concerning monuments already known and found others not previously reported. Field work was also carried on among the Carib Indians of British Honduras. A reconnaissance of the interesting archaeology of Salvador was also accomplished. A number of collections were secured in different localities, the largest and most important being from Salvador.

MR. ALANSON SKINNER of the department of anthropology spent the early part of the summer with the Kansa Indians in northern Oklahoma where data on their social life and societies was obtained, and the last sacred war bundle in the possession of the tribe secured. From that point Mr. Skinner went to central Oklahoma where work was taken up among the Iowa. Special attention was paid to the military and secret societies of the tribe and a complete ritual of the medicine dance was secured, as well as several specimens of different sacred bundles. A few days were spent among the Ponca where further data was collected upon the societies of that tribe. The latter part of the summer Mr. Skinner stayed at Sisseton, South Dakota, where with the assistance of Mr. Amos One Road, a young Sioux, investigations were made among the Eastern Dakota with special regard to material culture. These people, unlike the Oklahoma tribes, have given up almost everything that pertained to the old Indian life and are now actively engaged in farming. Some very old and unusual specimens were obtained however from people who had kept them as relics of the past.

DURING July, August and the greater portion of September Dr. Chester A. Reeds of the department of geology and invertebrate palaeontology together with Messrs. Hyde, Logan and Snider of the Oklahoma Geological Survey, as field assistants, made a collection of approximately 50,000 invertebrate fossils from the Hunton beds, Arbuckle Mountains, Oklahoma. Nine distinct geological horizons were established, five being Silurian, and four Lower Devonian. The collection sent to the Museum consists of small specimens, except for two well-preserved sections of a fossil tree (*Dadoxylon newberryensis*). The specimens of fossil wood have been placed on exhibition in the hall of geology.

THE Schrammen collection of Cretaceous fossils has been purchased by the department of geology and invertebrate palaeontology of the Museum from Dr. A. Schrammen of Hildesheim, Germany. It consists of eleven hundred species of invertebrates represented by four thousand specimens which were collected from some fifty localities and fourteen geological horizons in the upper and lower Cretaceous beds of northwest Germany. The phyla and sub-phyla represented are the Foraminifera, spongia, hydrozoa, anthozoa,

echinoidea, annelida, brachiopoda, gastropoda, pelecypoda and cephalopoda. Among the pelecypoda and cephalopoda are to be found the type specimens of Wolleman in his work on the Cretaceous of Misburg and Nettlingen. The most valuable portion of the collection is the large number of types of siliceous sponges from the Mucronaten and Quadraten Senonian strata. Those from Oberg are really beautiful, and although delicate, are remarkably well preserved. The descriptions of the type sponges appear in Dr. A. Schrammen's monograph on the *Kreidespongien*, *Palaeontographica*, Vol. V, Supplement.

MISS ANN E. THOMAS has been appointed assistant in the department of public education to fill the vacancy caused by the resignation of Mrs. Agnes Laidlaw Vaughan.

MR. ADOLPH ELWYN, who for the past nine years has been assistant in the department of anatomy and physiology, has resigned his position to become instructor in histology and biology at the Long Island College Hospital. Mr. Clarence R. Halter has been appointed to succeed Mr. Elwyn.

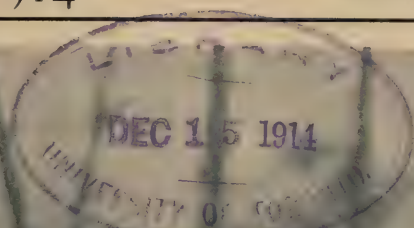
MR. F. E. WATSON has been appointed an assistant in the department of invertebrate zoölogy. He will devote the greater portion of his time to Lepidoptera.

DR. SIMOENS DA SILVA of Rio de Janeiro visited the Museum during October, having come to the United States as the official Brazilian delegate to the Congress of Americanists. Dr. Da Silva is interested in archaeology and has a private museum devoted to that branch of science.

IN the will of the late Miss Dessie Greer, an annual member of the Museum, the Museum is designated as a beneficiary of a fund of \$90,000, which is being held in trust during the lifetime of Miss Theresa Trimmer.

UNDER the will of the late Morris Loeb the Museum is designated as one of the beneficiaries of the residuary estate, appraised at \$989,857, subject to a life interest of Mrs. Loeb. The appraiser estimates that the Museum's share of this fund will be \$36,946. The Museum is also a contingent beneficiary of a special fund of \$25,000 to be used for the establishment or maintenance of a chemical type museum.

THE AMERICAN MUSEUM JOURNAL



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The Museum is open free to the public on every day in the year.

The American Museum of Natural History was established in 1869 to promote the Natural Sciences and to diffuse a general knowledge of them among the people, and it is in cordial coöperation with all similar institutions throughout the world. The Museum authorities are dependent upon private subscriptions and the dues from members for procuring needed additions to the collections and for carrying on explorations in America and other parts of the world. The membership fees are,

Annual Members.....	\$ 10	Fellows.....	\$ 500
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The Museum Library contains more than 60,000 volumes with a good working collection of publications issued by scientific institutions and societies in this country and abroad. The library is open to the public for reference daily — Sundays and holidays excepted — from 9 A. M. to 5 P. M.

The Museum Publications are issued in six series: *Memoirs, Bulletin, Anthropological Papers, American Museum Journal, Guide Leaflets and Annual Report*. Information concerning their sale may be obtained at the Museum library.

Guides for Study of Exhibits are provided on request by the department of public education. Teachers wishing to bring classes should write or telephone the department for an appointment, specifying the collection to be studied. Lectures to classes may also be arranged for. In all cases the best results are obtained with small groups of children.

Workrooms and Storage Collections may be visited by persons presenting membership tickets. The storage collections are open to all persons desiring to examine specimens for special study. Applications should be made at the information desk.

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Copyright photograph by Karl Moon

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WHITE WHALE PARTLY BEACHED IN A ROCKY COVE, ST. LAWRENCE RIVER

The white whale, or white porpoise as it is more correctly designated, reaches a length of eighteen feet and the adult animals are pure white except for a narrow brownish edging on the flanks and flippers. The young whales are entirely brown

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AMERICAN MUSEUM WHALE COLLECTION

By Roy C. Andrews

With photographs by the Author

THE active field work for the collection of whales began during the winter of 1907, when two North Atlantic right whales were killed at Amagansett and Wainscott, Long Island, and their skeletons secured for the Museum. The larger one, which proved to be of record size, was beached just at the edge of low tide where surf was continually breaking over it, and to secure all the bones of the skeleton was a difficult task. The weather was bitterly cold and after the second day's work a gale buried half of the body in sand. To dig it out it was necessary to build a breakwater of whale meat and even then the surf washed in from below, filling the pit so that we were working almost up to our hips in blood and freezing water while cutting blindly away at the bones buried deep in flesh. It took two weeks of the hardest kind of work to get the skeletons partially cleaned and loaded into a freight car for shipment to the Museum.

With these two specimens and a third right whale which had long been owned by the Museum, the Cetacean collection had a nucleus, and shortly afterward the skeleton of a splendid Atlantic finback was purchased through the generosity of Mr. George S. Bowdoin. Mr. Bow-

doin had already given the life-size model of a blue, or sulphur-bottom, whale which had been constructed in 1907 from measurements and photographs of a specimen taken at Newfoundland.

The building of this accurate replica of the largest animal which has ever been known to live upon the earth or in its waters, was something of a task. A light iron framework was first constructed; over this was stretched iron netting, and the exterior modeled in papier-mâché. The peculiar folds of the throat and breast were represented by means of long strips of wood cut to the proper shape and bent by steam. It required nearly eight months to build the model and before it was completed a whole world of experience had been gained as to "what not to do."

About the time the model was finished it was learned that three shore-whaling stations were in operation on the west coast of America, two being located on Vancouver Island and one in southeastern Alaska. Practically the only knowledge of the Pacific whales rested upon the work of Captain C. M. Scammon, whose book, "*Marine Mammalia*" had been published more than forty years before.

Just what relation the large Cetaceans



Young right whale taken at Amagansett, Long Island. This whale was probably only a few weeks old when killed. The skeleton was lost during a heavy storm which was beginning to break when the photograph was taken



A record right whale taken in 1907 at Amagansett, Long Island. The whale was beached just at the edge of low tide and was soon covered with a heavy coating of ice. It was the largest individual of the species which has yet been recorded. Not only the skeleton but the entire baleen was purchased for the Museum



Stripping off the blubber from a blue whale at Vancouver Island. Longitudinal incisions are made along the side of the whale and the blubber torn off in great strips by the aid of the steam winch. It requires only fifteen or twenty minutes to flense one side of a large whale



Drawing up a blue whale at Vancouver Island. The blue whale, as far as is now known, is the largest animal which has ever lived upon the earth or in the water



IRON FRAMEWORK OF THE BLUE WHALE MODEL IN THE MUSEUM

The iron skeleton was covered with wire netting upon which papier-mâché was spread. Eight months were required for the building of the model



By courtesy of National Geographic Magazine. Copyrighted, 1911

BLUE OR SULPHUR-BOTTOM WHALE

Life size model, length seventy-six feet. The weight of the animal from which the model was made was ascertained to be sixty-three tons

of this ocean bore to those of the Atlantic was unknown although some cetologists believed that all the large whales were cosmopolitan, and with this almost untouched field before us and the unusual facilities which a shore station offers for the study of such huge animals, the time seemed opportune to take up the work in the North Pacific.

Early in May, 1908, I left for Van-

more than five or six large whales, one can realize what a wonderful opportunity was presented for the study of a group of animals which, from the standpoint of evolution alone, are among the most interesting in the world.

The shore stations are located at convenient points near the feeding grounds of the animals, where the ships can come in each night bringing the day's catch.



Humpback whale showing tongue. The whale's tongue had been forced out of its mouth by air which was pumped into the body in order to keep the animal afloat. The tongue is a soft flabby mass of tissue which is held in place by the jaw bones

couver Island and began work there. During the time spent at the stations almost a hundred whales representing four different species were under observation and each specimen was carefully described, measured and photographed.

When one stops to think that before shore-whaling began, a naturalist might spend an entire lifetime without seeing

The whales are anchored at the end of a long inclined platform called the "slip" and the huge carcasses, sometimes weighing seventy tons each, are drawn entirely out of the water. By means of his notebook, tape measure and camera the naturalist, if he works quickly, can bring away with him a fairly complete record of the animal's external anatomy before



*By courtesy of National Geographic
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FIVE HUMPBACK WHALES AT VANCOUVER ISLAND TAKEN DURING A SINGLE DAY'S HUNT

the body is denuded of its blubber coating.

The blubber which covers the bodies of all Cetaceans is a layer of fat which acts as a non-conductor to prevent the bodily

heat from being absorbed by the water, and thus keeps the animal warm. It can be stripped off just as one would peel an orange and by means of the steam winch one side of an eighty-foot whale



By courtesy of National Geographic Magazine. Copyrighted, 1911

Two humpback whales diving. They had been feeding near the surface, coming up to blow every few seconds. The great diversity in the shape of the dorsal fin in this species is well shown by these two individuals



White whale diving. Passengers on the steamers traversing the St. Lawrence River often mistake the bodies of the white porpoises for whitecaps. This photograph shows the white whale in the act of diving with the maximum amount of body exposed above the surface of the water

can be "flensed" in twenty minutes. The body is then turned over by means of the "canting winch," the other side denuded of its blubber covering, and the viscera removed. The whale is hauled to the "carcass platform," the flesh stripped off, the skeleton disarticulated and the bones chopped in pieces.

While this work is going on, an opportunity is given the naturalist to secure valuable observations upon the skeleton as the bones lie in position — if he be not afraid of blood and grease. The exami-

nation of fresh specimens is the only way in which many disputed points in the osteology of the large whales can ever be settled, for after the skeletons have been disarticulated the smaller bones are almost invariably lost in the tons of flesh with which the skeleton is covered.

Before 1864 when the invention of the harpoon gun by Svend Foyn made the shore station possible, dead whales which had been cast upon the coast were almost the only ones which ever came under the observation of a trained ob-



Towing a white whale to the beach. This animal had just been killed from a canoe and is being towed to the beach where its skeleton was removed for the Museum



Pacific blackfish (*Glopiocephalus scammoni*). This is a very rare species and practically nothing has been known hitherto of its external characteristics

server. These specimens were nearly always in a more or less advanced state of decomposition and badly bloated by gases so that little of their true form remained. All Cetaceans change color very rapidly after death and unless the animal is seen before it has been exposed to the air, accurate descriptions of its color in life cannot be obtained. For instance, the Atlantic finback for many years has been described as "black" although it is never black in life.

When the work of the Vancouver Island stations was finished I went northward to study finbacks at Tyee, on Admiralty Island, Alaska, for at the southern stations only humpback, blue and sperm whales had been taken.

I came back to New York in the fall with much information about the Pacific whales and an intense desire to continue the work. An opportunity soon presented itself and the following June

I went to Quebec to study and collect the beautiful "white whale," the *marsouin blanc* of the French dwellers along the St. Lawrence River. Although this species is a true ice porpoise and is never found where the water is far above the freezing point, yet early in the spring the animals come into the St. Lawrence River by thousands, their white bodies looking more like foamy wave crests than things of life. They are hunted for their skins which give the "porpoise hide" of commerce, each animal being worth about seven dollars.

The whales were killed by first shooting them with a heavy musket as they rose to blow, then paddling up in a small canoe and throwing a harpoon as they thrashed their white lengths about upon the water. The first whale we killed was a full-grown male absolutely pure white, except for a narrow grayish edging on the flukes and fins. It was

beached in a sandy cove where the gray rock wall rose in a jagged mass, making a perfect background for the white body, its purity of color intensified by the crimson streaks of blood which dripped from the bullet holes. There was something almost unearthly about the picture, the beautiful ghostlike animal, a very Spirit of the North, seeming strangely out of place away from its icebound home. Five complete skeletons were secured of the *marsovin blanc* on this expedition as well as plaster molds of its body.

Early in August of the same summer a temporary appointment on the United States Steamship "Albatross" bound for a cruise of zoölogical exploration in the Dutch East Indies was offered, and I joined the ship at Manila, Philippine Islands. In the first part of the expedition the only Cetacean material which was secured consisted of several skulls of the Southern Pacific blackfish. These have thrown new light on the blackfish of the southern waters and will probably

necessitate an entire revision of the genus.

After the East Indies cruise was ended I went up to Japan early in February of 1910 and obtained permission from the Toyo Hogeï Kabushiki Kaisha [Oriental Whaling Co., Ltd.] to study and collect specimens at their stations. The president and directors of the company not only offered the free use of their ships and stations but also presented to the Museum all the skeletons which we desired to collect.

This was an unrivaled opportunity, for the Japanese whales had been in the most complete scientific darkness and what species were to be found there was quite unknown. Work was begun at the island of Ōshima close to the northern entrance of the Inland Sea and continued for several months at this and neighboring villages. The skeleton of a splendid blue whale seventy-nine feet in length was secured. I was also intensely delighted to find that a whale



Whaling station at Aikawa, Japan. The stations are always located in a little bay near the feeding grounds of the whales. In the distance is seen a large steamer which was used by the Russians as a "floating factory" and was captured by the Japanese during the late war with Russia.



Shooting a sei whale. This photograph was snapped at a speed of one one-thousandth of a second just as the harpoon had struck the whale. The smoke, sparks and wads of oakum with which the gun was loaded are seen in the air. Note the whale's nostrils which are widely expanded as the animal was drawing in its breath preparatory to descending into the water

called the *sejhal* by the Norwegians and the *iwashi kujira* or sardine whale by the Japanese, was being taken here.



Sei whale drawing in its breath. The nostrils are shown widely expanded and greatly protruded

This whale, although forty to fifty feet long had never before been recorded in the Pacific and although it had formed the basis of the Japanese summer fishery for nearly fifteen years, not a single individual had reached the attention of a scientist. Whether or not this species will prove to be synonymous with the sei whale (*Balaenoptera borealis* Lesson) of the Atlantic has not yet been determined, but it is the subject of a monograph now in preparation.



Killer whale secured for the Museum. This species wages a continual warfare upon the gray whale and often assists the human hunters by frightening the gray whales so badly that they turn on their backs and lie motionless at the surface of the water



The spout of the finback whale rises to a height of from fifteen to twenty feet. It is exceedingly difficult to photograph unless as in the present case, there happen to be mountains to form a dark background. Finbacks can undoubtedly swim faster than any other large whale, probably reaching a maximum speed of thirty-five miles per hour



CUTTING IN A FINBACK WHALE AT AIKAWA, JAPAN

The whale is being drawn partly out of water and will be cut in sections before flensing



THE GREYHOUND OF THE SEA — A FINBACK WHALE, ALASKA

By courtesy of National Geographic Magazine. Copyrighted, 1911



CUTTING IN A SEI WHALE

This method of cutting in is followed only in Japan. The entire posterior portion of the whale is drawn out upon the wharf

A fine killer whale (*Orca orca*) was also obtained at Ōshima and later in the year a second killer was taken.

After shipping the skeletons to New York from Shimonoseki, Japan, the work was continued in the northern part of the country at the little village of Aikawa. Many *sejhval* were taken here during the summer, giving a splendid opportunity to investigate the species.

At Aikawa, skeletons of a large fin-back, a sixty-foot sperm whale and ten porpoises were secured. The sperm whale was killed especially for the Museum by Captain Fred Olsen, who did

his best to secure a large individual. Off the coast of Japan, sperm whales sometimes appear in herds of from twenty or thirty up to five hundred individuals, and when a school is found it is an easy matter for each ship to kill five or six; one of the Japanese gunners even brought in as many as ten at one time. The crate containing the skull alone of the sperm whale which was shipped to the Museum, had a space measurement of twenty-six tons and was of such size that it would barely pass through the hatch of the ocean liner which carried it to New York.



Cutting in a gray whale, Korea. The body is being divided so that the posterior half may be drawn upon the wharf



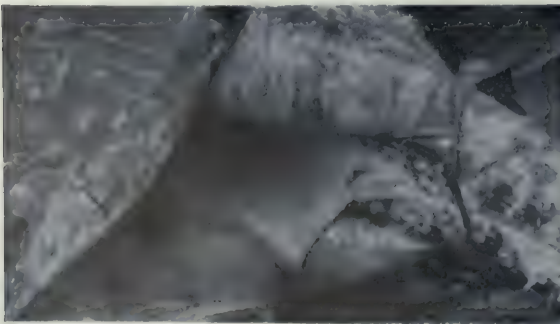
Lower side of head and breast of female sperm whale. There is considerable difference in the shape of the head of the male and female of this species, a fact which has not been widely recognized by cetologists

The porpoises were of great interest. Ten specimens were secured comprising four different genera and five species. One proved to be a very extraordinary specimen representing a new genus which differs in many respects from all other members of the family.

While in Japan it was learned that a whale called the "devilfish" by the Japanese, and which I could identify only as the California gray whale, was taken off

the coast of Korea during the winter. This information was exceedingly interesting because, since 1880, this species had been lost to science and naturalists believed it to be extinct. It was impossible to secure specimens of it at this time, but in the following year I returned to Japan to investigate the so-called "devilfish." As suspected, it was found to be the lost California gray whale and two complete skeletons

were secured as well as photographs, measurements and descriptions of over thirty individuals. A very large humpback whale was also taken, and a third killer, together with a considerable amount of alcoholic material for embryological and histological study. The humpback skeleton was unfortunately destroyed by fire in the summer of 1913 after it had been



The tongue of the sperm whale contrasts strongly with that of the humpback shown in a preceding photograph

shipped to Ward's Natural Science Establishment at Rochester, New York, for cleaning.

During the intervals of field work active operations for securing skeletons of the smaller Cetaceans by purchase and exchange have been going on and several very valuable specimens have been acquired. Among the most notable is the complete skeleton and baleen of the pygmy right whale (*Neobalæna marginata*) one of the rarest and most interesting of living whales.

is being studied as rapidly as possible and the results published as volumes of the *American Museum Memoirs* under the title *Monographs of the Pacific Cetacea*. Part I, *The California Gray Whale*, has recently appeared and another volume dealing with the *sejhal* is well on the way toward completion.

This material, illustrating one of the most interesting and important groups of living mammals, is at the present time utterly inaccessible to the public or to scientific men because of the lack of exhi-



Removing the spermaceti from the head of a sperm whale. Twenty barrels of liquid spermaceti were secured from the head of this specimen, the skeleton of which was sent to the Museum

Our collection of Cetaceans is to-day probably the most important in the world, especially in the almost complete representation of the large forms. We need greatly the bowhead, or Greenland right whale, and prospects are good for securing a skeleton through an expedition which may leave for Hudson Bay next summer. Another humpback will also have to be obtained in the near future.

The material which has been acquired

bition space. The foundations have already been laid for the hall of water mammals in the east court, but operations have been suspended indefinitely because the necessary funds for the completion of the building have not been advanced by the city.

No more skeletons can be prepared until room is available and this valuable material, much of which could never be duplicated is suffering badly and may even be permanently injured. The

American Museum has an opportunity to exhibit the finest collection of aquatic mammals in the world. It has both the material and the land area and no need is greater than the completion of the court building. Until that time all exhibition work in this department is at

a standstill, the collections which have been gathered at great labor and expense are in danger of deterioration, and the public is being deprived of one of the most instructive and interesting exhibits which any museum can offer its patrons.



Side view of Pacific right whale porpoise (*Tursio borealis*). Three fragmentary skulls of this exceedingly rare species were the only specimens preserved in museums before the expedition to Japan secured three complete skeletons, with accompanying data of external structure. (Note the absence of a dorsal fin)



Ventral view of Pacific right whale porpoise (*Tursio borealis*)



Head of a Pacific dolphin (*Lagenorhynchus obliquidens*). This is one of the most common dolphins of the North Pacific and yet it is rare in collections. Five skeletons were secured for the American Museum

KITCHEN MIDDENS OF JAMAICA

REPORT OF AN INVESTIGATION OF THE KITCHEN MIDDENS OF THE ARAWAK INDIANS, WITH A HISTORICAL INTRODUCTION ON THIS ABORIGINAL RACE NOW EXTINCT ON THE ISLAND OF JAMAICA

By G. C. Longley

INTRODUCTORY NOTE FROM THE DEPARTMENT OF ANTHROPOLOGY: A collection from Jamaica, which contains some fifteen hundred objects, has been presented to the Museum by Mr. G. C. Longley of Pelham Manor, New York, and is now on exhibition in the South American gallery on the third floor. Mr. Longley for the last six years has passed the winter months on Jamaica, and being an enthusiastic amateur archaeologist, has occupied his time while there in exploring the kitchen middens of the Arawak, the aboriginal inhabitants of the island.

These kitchen middens are the refuse heaps of the Arawak and consist largely of shells and pottery, fish, turtle and cony bones, implements and of course ashes. The most common finds are fragments of pottery and celts and axes of stone. The pottery when ornamented generally has designs in straight lines which were made by pressure of some sharp object while the clay was soft. The typical stone axes of these shell heaps are remarkable for workmanship and beauty of form. They are very symmetrical throughout, with the cutting edge nicely rounded and tapering to a point at the opposite end. Celts of shell are sometimes found, but they do not occur on Jamaica as frequently as on some of the other islands of the West Indies.

Stone images, often in the form of pestles occur, and Mr. Longley was fortunate enough to find two good examples. They are thought to be idols and at any rate were probably connected in some way with religious rites. Mealing stones and stones used to grind and sharpen the celts and axes are well represented, but the most interesting objects from the anthropological point of view are the cylindrical stone pendants. Identical pendants are worn to-day as insignia of office by chiefs or headmen of tribes, across the entire length of northern South America.

FOR the past six winters I have been visiting the island of Jamaica, that wonderful winter paradise in the Caribbean Sea. It was not until 1912 however, that I began to make a study of the aboriginal Indians of the island and to conduct systematic excavations in certain localities with the purpose of collecting as many relics as possible of this bygone race.

These aborigines were the Arawak and were first known to civilization through the voyages of Columbus. It was on the second voyage of Columbus in 1494 when he was coasting the southern side of Cuba that he sighted land to the south and soon came to anchor on the north coast of Jamaica. He named this land "Santa Gloria" and gave an eloquent description of the beauties he beheld, the verdure of the shore, the splendor of the mountains and its good harbors, one of which he called "Puerto Bueno." The Admiral here encountered Indians who at first made a hostile display, but who soon became friendly after they were

given clothes and other articles unknown to them and later sent ambassadors to the Spaniards with gifts of fish, fruit and cassava bread.

While one cannot say with absolute certainty where Columbus landed on Jamaica, and in consequence cannot give the exact locality of the Admiral's Santa Gloria and Puerto Bueno, it is probable that Santa Gloria was the modern Saint Anna's Bay and Puerto Bueno either the modern Dry Harbour or Rio Bueno, more likely the former, as the harbor better fits in with the description given by Columbus. It is interesting to note that the excavations I conducted in the interior of the island were made due south of Dry Harbour and Rio Bueno, so that the Indians met by the Spaniards in Puerto Bueno were probably of the same tribe as those from whose village sites I collected many relics.

Columbus visited Santa Gloria again on his fourth voyage in 1503 and beached his ships in a small cove — and there is an inlet known to this day as "Christo-

pher's Cove." Columbus remained here for one year and the Spaniards with him had an opportunity to study the customs of the Arawak.

Oviedo, official historian to the court of Spain, a contemporary of Columbus, tells of the almost ideal existence of the Arawak. From his accounts, as from those of later writers, it appears that they took life very easily. As is customary with so many primitive tribes the women tilled the fields, and did the principal work, while the men engaged in the chase or in fishing, and spent the intervals comfortably in their *hamacas*, forerunners of the modern hammocks, for which there is little doubt we are indebted to the Arawak.

Picture to yourself a green, fertile hilltop, from which the wood has been cleared by fire. Surrounding it are several other hills, on which the woods and undergrowth are still in a virgin state, and which consequently allow a safe escape in case of a raid from the dreaded Caribs. In practically all of the West Indian islands, caves are plentiful, and must have proved of the utmost value as hiding-places. I have conducted explorations in a cave near Alexandria in which one could easily hide hundreds of men. The gulley surrounding the hilltop on which the village site is found, assured a plentiful crop of cassava, while the neighboring hills swarmed with conies. Snails, too, were plentiful, and judging from the shell-heaps existing to-day, must have been eaten in enormous quantities.

The hilltop, like all hilltops in a limestone country, has many hummocks on it, and upon these the aborigines built their octagonal houses, made of upright posts, thatched with palm leaves. According to early writers, these huts frequently were of a considerable size, the floors made of hard clay and always swept

clean. In front of each was a green slope, and back of it the refuse heap on which the empty shells, broken stone implements, and broken cooking pots were thrown. Apparently the cooking was also done here. In excavating some of these refuse heaps, we find thick layers of wood ashes, mingled with the shells. Upon the location of the village depends the character of the shells. In inland middens are large snail shells with an occasional sea product, such as a conch or clam shell. The bones of large fish are also found occasionally in inland middens, and I dug out some vertebræ of the rock fish, and the jaw bone of a parrot fish, which by its size indicates that the fish was three or four feet in length. Ancient writers tell us that the large fishes were reserved for the chief so it may have been that we were uncovering the kitchen midden of the most important dwelling in the village.

My excavations were conducted at St. Acre, Scarboro, Greenhill and Armordale, in St. Ann Parish, and at Logie Green in Clarendon Parish. My first operations were at St. Acre where some few years ago I discovered large shell deposits when a new road was being cut on the property. The next season I unearthed some fragments of pottery in the deposits. This led me to conduct larger excavations, and I engaged native laborers to assist me in the task. I discovered several small hummocks on the St. Acre hilltop, and made trenches through these, sometimes five or more feet deep, and found deposits of shell, ashes, charcoal and fragments of pottery and stone implements at different levels, as if the Indians had abandoned the village site, and had returned after a time. In this work I was frequently assisted by men who thought I was digging for gold. I paid them for any specimens they brought to light and in

consequence the news spread after a while that I was paying real money for Indian stones, and I was rewarded by having many hatchets, stone pendants, and pestles brought in to me.

My work at Greenhill was the most extensive, and from the middens there — although they are similar to the St. Acre and other middens — I obtained the best specimens.

The extinction of the Arawak was so complete that there are but few similar cases in history. People like this race, living in a tropical climate, quite unused to work of a laborious nature, would speedily feel the effects of forced labor. After the Spaniards came, they needed workers for the gold mines in Haiti, for the making of roads and the cultivation of crops in Jamaica. They forced the Indians to labor for them, and with the cruelty characteristic of the age, killed off the natives with almost incredible swiftness.

It is only natural that the Arawak came to have a different view of people whom they at first fondly imagined were sent from heaven, and it was not long before they took to their mountain retreats, in order to escape forced labor and a painful death. But what could a peaceful race, with practically no weapons of defence, do against the superior weapons and the bloodhounds of the Spaniards? The Jamaican Arawak were exterminated by 1558, only sixty-four years after the discovery of the island, and none were left to tell a later generation of their tribal customs. The meager accounts given by Columbus and his contemporaries have to be supplemented by such conclusions as we can draw from a study of the relics left in their kitchen middens.

Columbus, in his description of the natives of Jamaica, lays special stress upon their proficiency in the art of work-



Two of a considerable series of spindle-shaped celts found in Jamaica by Mr. Longley. They were probably used as chisels. The specimens figured are of black and green stone respectively

ing stone, and mentions having seen some good stone ornaments worn by the heads of tribes.

Two notable objects in the collection are the two idols or zemes of brown sandstone, about five and one-half inches in height. They crudely represent the human form, and undoubtedly were con-





STONE AXES FROM JAMAICA

Stone axes and celts are found in large numbers throughout the West Indies. They served the prehistoric Indians as axes, knives and chisels. It is a popular belief to-day among the ignorant on the island that such stones are the product of celestial phenomena and they are widely known as "thunder bolts" or "thunder balls." The collection contains two hundred and sixty such specimens. The specimens shown are highly polished and vary in color from dark or blackish green to light green, gray or brown. The celts in the collection vary in length from about one inch to nine inches. The largest stone in the plate above (page 298) is about nine inches long



Idols of brown sandstone (5½ inches high). Such idols were undoubtedly connected with the religious rites of the Arawak. Various animals also were used as idols, the snake on the island of Haiti, the parrot on Jamaica and the monkey on the more southern islands



The most interesting objects in the Longley collection, from the anthropological point of view, are cylindrical stone pendants. Pendants identical with the large one at the left and the one shown on the following page are worn to-day as insignia of office by chiefs or headmen of tribes across the entire length of northern South America. The hole in the pendant at the right is so small that one wonders how the Arawak could have drilled it without the use of metal tools. The white stone (1½ inches long) in the middle has not only a hole through the upper end but also a hole drilled at right angles to it lengthwise from one end of the pendant to the other. In the same class with the stone pendants are shell ornaments with holes drilled through them, which the Arawak also wore suspended around the neck

nected with the religious rites of the Arawak. Like many prehistoric tribes, the Arawak had good and bad deities which they worshipped. They had in fact, it is known, several goddesses to whom homage was paid, and offerings were made at certain seasons of the year, and on certain festivals. These ceremonies were conducted by the shamans, who were both priests and medicine men. The deities generally were represented by zemes, small stone or wooden idols, the former often in the shape of amulets which were worn around the neck, suspended from a cord. Various animals were also worshipped, the snake on Haiti and Porto Rico, the turtle and the parrot on Jamaica, and the monkey on the more southern islands.

Among the objects made by working stone, fall also the pendant ornaments. These have been fashioned with considerable skill and certainly with great patience, when one takes into account that the Arawak had no metal tool to work with, but laboriously fashioned the pendants with the aid of sand, stone and an incredible amount of rubbing. The hole in the pendants is often so small that it makes one wonder how the Arawak could have drilled it with the rude tools they had.

Pottery is perhaps the most important class of Arawak relics, because the forms of their vessels and the kind of designs used in decorating them show the artistic status of these ancient people. They used a great deal of pottery in cooking their food over wood fires. The evidence of this is seen in the external smoked and blackened portions of vessels discovered. The pottery is fragmentary, as is always the case in these middens. Entire objects of terra cotta from the West Indies are extremely rare, having been found only occasionally in caves, where they were put with the remains of the dead,



Cylindrical stone pendant of the Arawak such as is worn to-day by chiefs of tribes in the northern part of South America. Such pendants were fashioned with the aid of sand and stone and an incredible amount of rubbing



POTTERY FRAGMENTS FROM JAMAICA

The Arawak used a great deal of pottery in cooking their food over wood fires, a fact proved by the smoked and blackened portions of vessels discovered. The vessels were made by coiling bands of wet clay one upon another and afterward smoothing them down with a stone before firing. Decorations when they exist have considerable variety, made with a sharp instrument such as a shell or flint

as receptacles of food for the last journey of the departed.

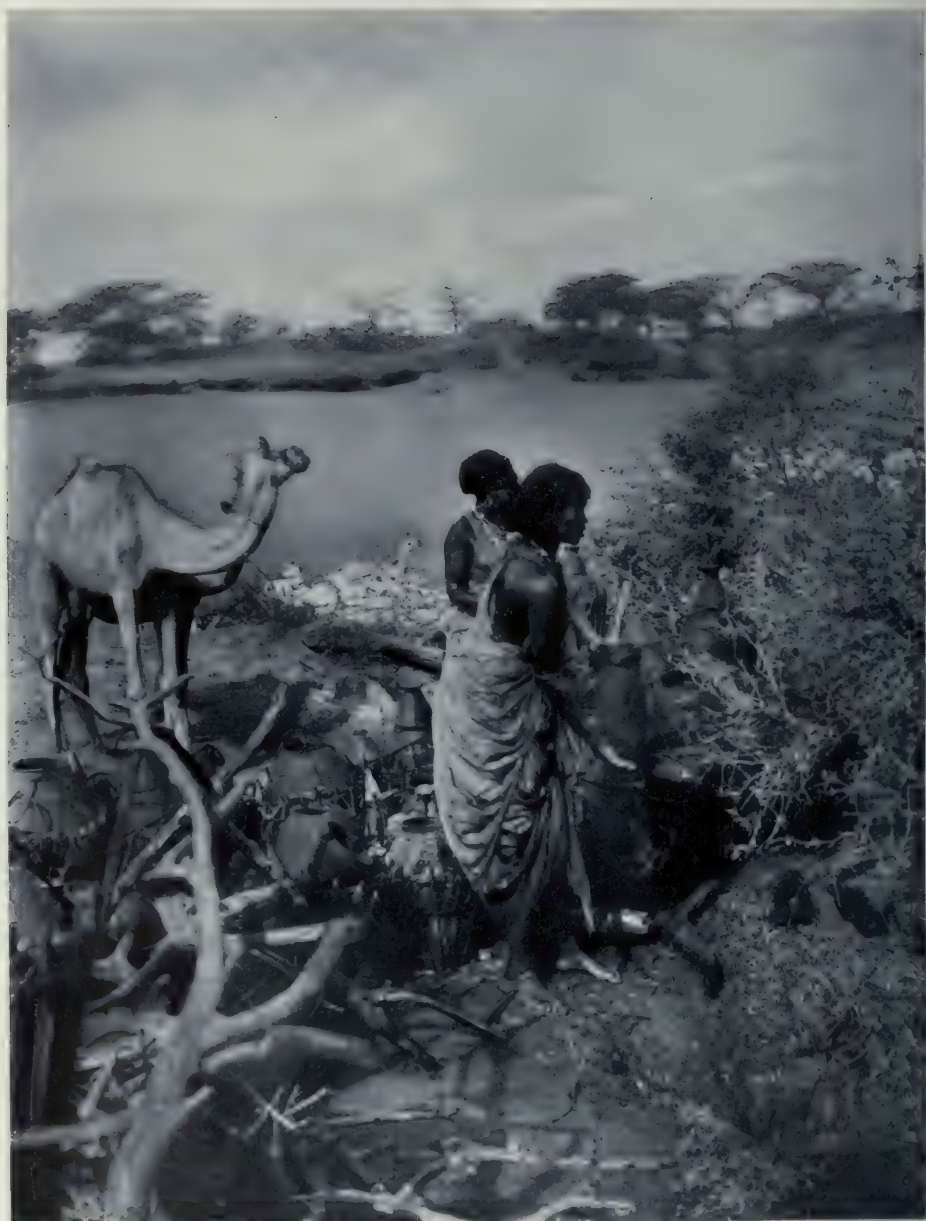
Arawak pottery was never glazed and I could not find any on Jamaica that had been painted in colors, the clay usually being an even shade of brick red, with an occasional sherd of a buff color. A greater part of the pottery found is without ornamentation of any kind. It is only now and then that a decorated piece is discovered.

There is a great variety however in the thickness, size and shape of the vessels. Some have handles, or lugs; some have none. Some are canoe-shaped, the bow being the "pouring out" end; others are

round, and some have rims with turned-in edges. There are both deep and shallow vessels, but no evidence that pottery covers were used. I have found one or two sherds, as the broken pieces of a pot are called, that indicate in what manner vessels were built up. This was done by coiling bands of wet clay one upon another, and afterward smoothing these down with a stone or other flat object. When one considers that the Arawak did not know the use of the potter's wheel, it seems remarkable that they could fashion their vessels with so much delicacy of outline, and such superior workmanship.



Three handles of pottery vessels. The first is a crude representation of a human face, the second shows incised decoration. The third handle must have been made by pinching the material of the vessel while still plastic with the thumb and index finger



AT A WELL IN SOMALILAND

AN EPISODE OF A MUSEUM EXPEDITION

By Carl E. Akeley

With photographs by the Author

IT was a couple of days after crossing the Houd — we had come a hundred miles of waterless desert in Somaliland. We were camped beside a "tug," a dry river course where by digging wells in the stream bed sufficient water for the camels and sixty men was obtainable. Hunting in the open bush of the region, we had seen many ostriches during the two days. It was my first experience with these wary birds and they had managed to escape on each and every occasion of our meeting. I found that instead of hiding their heads in the sand, leaving the great black bodies as targets for my rifle, they kept their bodies hidden behind the bush with only their heads exposed, each head just large enough to carry a pair of very keen eyes. As a result of being continually outwitted by them I came to feel that an ostrich was game well worth while, that I would rather bag an ostrich than a lion.

One Sunday morning I set out with the intention of devoting the day to an ostrich hunt. Concluding that the smaller the party the better the opportunity, I took only a mule and my syce. In the early morning when only a half mile from camp I met an old hyena who was loafing along after a night out. A moment later one look at his dead carcass was enough to satisfy me that he would not make the desirable specimen I had thought, for his skin was badly diseased. A little later I shot a good wart hog for our scientific collection. Leaving the specimen where it lay, I marked the spot and continued in search of the plume-bearers.

A little way farther on I climbed to the

top of a termite hill about eight feet high to look the country over with field glasses. As I held the glasses to my eyes while adjusting the focus, I suddenly realized that the letter S that I was focusing on was the head and neck of an ostrich and that there was a second letter S beside it. The birds remained perfectly motionless watching and I did likewise, locating their position meanwhile by the termite hills which were nearly in line between us. Suddenly the heads ducked and disappeared behind the bush. I dropped from my perch and ran rapidly to where they had been, but found only their trail in the sand.

When I had given up tracking them and was about to start farther afield, I came into an opening in the bush that was about thirty yards wide and two hundred yards long. Near the center of the opening was a dense green bush a dozen feet in diameter. A beautiful cock ostrich broke into the clearing at full speed just below the bush and as I raised my rifle he disappeared behind the bush, so I held ready to catch him as he passed over the remaining fifteen or twenty yards of clear ground. I stood there ready until I felt foolish, when I ran quickly to the bush expecting to find him just on the other side. He was nowhere in sight but his trail told the story. As he had come into the open he had seen me and when behind the bush he had stopped short as indicated by a great hole and swirl of sand where he had caught himself by one foot, had turned at right angles and run straight away the length of the clearing, keeping the bush between himself and his enemy. I got one shot

at him later—putting my sights at seven hundred yards, I placed a bullet in the sand between his legs.

We returned to camp later in the afternoon and after a little rest and refreshment I started out again with only the syce and carrying the necessary tools to get the head of the wart hog that I had shot in the morning. We had no difficulty in finding the place but there was nothing to be seen of the pig. The place was strewn with vulture feathers but surely vultures could not make away with the bones. A crash in the bushes at one side led me in a hurry in that direction and a little later I saw my pig's head in the mouth of a hyena traveling up the slope of a ridge out of range.

We started for camp as the sun was setting. As we came near to the place where I had shot the hyena in the morning it occurred to me that perhaps there might be another hyena about the carcass and feeling a bit "sore" at the tribe for stealing my wart hog, I thought I might pay off the score by getting a good specimen of a hyena for the collections. The syce led me to the spot but the dead hyena was nowhere in sight. There was the blood where he fell and in the dusk we could make out a trail in the sand where he had been dragged away.

Advancing a few steps a slight sound attracted my attention and glancing to one side I got a glimpse of a shadowy form going behind a bush. I shot hastily into the bush, and as we started forward the snarl of a leopard warned us of the chances we were taking. We waited a few moments and there was no further demonstration.

I began looking about for the best way out of it, for I had no desire to try conclusions with a possibly wounded leopard when it was so late in the day that I could not see the sights of my rifle. My intention was to leave it until

morning and if it had been wounded, there might then be a chance of finding it. I turned to the left to cross to the opposite bank of a deep narrow tug and when there I found that I was on an island where the tug forked and by going along a short distance to the point of the island I would be in position to see behind the bush where the leopard had stopped.

While peering about I detected the beast crossing the tug some fifteen yards above and foolishly began shooting while I could not see to aim. I could see where the bullets struck as the sand spurted up beyond the leopard. The first two shots went above her, but the third scored. The leopard stopped and I thought she was killed. The syce broke into a song of triumph which was promptly cut short by another song such as only a thoroughly angry leopard is capable of making as it charges. For just a flash I was paralyzed with fear, then came power for action. I worked the bolt of my rifle and was conscious that the magazine was empty. At the same instant I realized that a solid point cartridge rested in the palm of my left hand, one that I had intended as I came up to the dead hyena to replace with soft nose. If I could but escape the leopard until I could get the cartridge into the chamber!

As she came up the bank on one side of the point of the island, I dropped down the other side and ran about to the point from which she had charged, by which time the cartridge was in place, and I wheeled—to face the leopard in mid-air. The rifle was knocked flying and in its place was eighty pounds of frantic cat. She struck me high in the chest and caught my upper right arm with her mouth, chewing and growling fiercely. With my left hand I caught her throat and tried to wrench my right

arm free but succeeded only in drawing the full length of the arm through her mouth an inch at a time. I was conscious of no pain, only of the sound of the crushing of tense muscles and the choking snarling grunts of the beast.

We went to the ground, the leopard underneath, my right hand in her mouth, my left clutching her throat, my knees on her lungs, my elbows in her armpits spreading her front legs apart so that her frantic clawing did nothing more



The natives come long distances to water their camels and sheep at the wells of the desert



Three camel men of the expedition. Natives of Somaliland are devotees of courage and ostracize any of their fellows who show the white feather

than tear my shirt. Her body was twisted in an effort to get hold of the ground to turn herself but the loose sand offered her no hold. For a moment there was no change in our positions and for the first time I hoped for a chance. Up to then it had been simply a good fight in which I expected to lose, but if I could keep my advantage perhaps the syce would come with a knife. I called but to no effect. I still held and surged down with my knees; one hand down her throat as far as I could thrust it and the other gripping her throat, was certainly a strangle hold. I felt her relax, a sort of letting go although she was still struggling. At the same time I felt myself



Some of the Somali wells are eighty feet deep and require at least eight natives supported one above the other on steps along the walls of the well, to pass the water in wooden buckets (*chatties*) to those waiting at the top

weakening similarly, and then it became a question as to which would give up first.

After what seemed an interminable passage of time, I let go and tried to stand, calling to the syce that I was finished. He now screwed up his courage sufficiently to approach. Then the leopard began to gasp and I saw that she might recover, so I asked the syce for the knife. He had thrown it away in his fear, but quickly found it and I at last made certain that the beast was dead. I tried to shoulder the leopard to carry it to camp but was finally satisfied to get myself to camp.

When I came inside the *zereba*, my companions were at dinner before one of the tents. They had heard the shots and had speculated on the probabilities. They had decided that I was in a mix-up with a lion or with natives, but that I would have the enemy or the enemy would have me before they could get to me, so they had continued their dinner. The fatalistic spirit of the country had prevailed. When I came within their range of vision however, my appearance was quite sufficient to arrest attention and moreover my demands for all the antiseptics in camp gave them something to do. While my companions were getting the surgical appliances ready, my boys were stripping me and dousing me with cold water, and at that time I regretted that the leopard had not been victorious.

Later in the evening they brought the leopard in and laid it beside my cot. The first shot as she went behind the bush had broken the toes of the right hind foot. The only other bullet that struck her was the last before she charged and that had creased her just under the skin on the back of the neck, from the shock of which she had instantly recovered,

NEWS FROM THE CROCKER LAND EXPEDITION

By Edmund Otis Hovey

THE Museum received advices November 23 from the Crocker Land expedition to the effect that Donald B. MacMillan, leader of the expedition, accompanied by Ensign Fitzhugh Green, engineer and physicist of the party, had journeyed one hundred and twenty-five miles northwest from Cape Thomas Hubbard across the ice of the polar sea in search for Crocker Land, the land whose mountainous heights Admiral Peary thought that he descried from an elevation of 1,400 feet on Cape Thomas Hubbard in 1906. For two days Messrs. MacMillan and Green thought that they saw land, but this proved to be a mirage, and they finally concluded that Crocker Land does not exist, at least within the range originally ascribed to it.

The journey out and back from Cape Thomas Hubbard occupied two months and proved to be extremely perilous. The party crossed thirty-eight leads on thin ice, lost most of their dogs on the journey and on the day after they got back to Cape Thomas Hubbard, in the middle of May, "the ice on the polar sea broke up and became a hideous, grinding chaos of broken ice on which they would certainly have perished had they not got back as they did."

Mr. W. Elmer Ekblaw, geologist and botanist of the expedition, through whom the foregoing announcement has come to the Museum, writes further as follows, his letter being dated August 29, 1914, and written on board Knud Rasmussen's motor boat just south of Cape Alexander, only fifteen miles from Etah:

Knud Rasmussen's boat (small motor boat) has got to a hunting camp where Jot

Small and I have been kept for six days by ice and wind, unable to return by our motor boat past Cape Alexander to Etah, and Rasmussen's boat can not get by either. His ship must leave [Thule, North Star Bay] for Denmark day after to-morrow. On account of ice conditions his motor boat can not wait to go to Etah after our mail and MacMillan's cablegrams. Jot and I came down with three Eskimo to kill walrus for our winter supply and have been unable to get back since August 24. Thus we met Rasmussen's boat. I may say that we are all well, and have given up hope for a ship from America this year; that Mac has said that we *must* get back next year; that we are trying against heavy odds to get a wireless through this coming winter; that we are planning a strenuous year's work for this next season; and that everything thus far has been eminently successful, both exploration and scientific work.

I am very much concerned as to what effect this inability of Rasmussen's boat to get to Etah will have, but we have been up to the very base of Cape Alexander (a quarter of an hour ago) and the sea is raging. Apparently there is no hope to get any of our mail back until winter sledging begins. Then we shall be able to get our mail through as we did last year, from Upernivik.

Tanquary and I spent the summer at Umanak, North Star Bay, studying the geology and biology of the region there. MacMillan and Green got back in the middle of May after two months on the trail. I had to return from Bay Fjord because of a frozen foot (all well now). Only three of us started, with seven Eskimo, ten sledges in all.

At the best I have only a few more minutes to write, for Rasmussen's men will stop only long enough, when they reach our camp again, to unload the supplies and mail, for the seas and ice necessitate their immediate return to North Star Bay. Ice conditions all along the coast have been bad this year.

In conclusion, let all our friends know that we are well and contented, that for another year at least, we have plenty of everything we need to keep the wolf from the door of our igloo. Tell our friends that though we think of them often, our work is not yet

done, and until it is we shall not be homesick. Finally, best regards to everybody.

Also commend K. Rasmussen for his unswerving, continued and exquisite courtesy toward our expedition. I think some public mention should be made of it.

Of course the organizing institutions, the American Museum of Natural History, the American Geographical Society and the University of Illinois, are keenly disappointed to learn of the non-existence of Crocker Land at the place where it was reported to be, but they await receipt of the full reports which will come from Mr. MacMillan next April or May before drawing any conclusions from this portion of the Crocker Land

expedition's work. Undoubtedly the scientific data, including soundings, which must have been secured by Mr. MacMillan and Ensign Green will prove of the highest value, even if they show that the supposed land does not exist. Mr. Ekblaw's letters indicate that all the other portions of the program of work were carried out satisfactorily and although we have not the gratification of getting full reports and personal letters from all the staff, we know that the men were at Etah and well at the end of the summer and that they received the missives which were sent to them by way of Copenhagen last spring.

MUSEUM NOTES

THE sixth annual joint session of the American Academy of Arts and Letters and the National Institute of Arts and Letters was held in New York on November 19 and 20. The President and Trustees of the Museum tendered a reception to the members of these two academies and a representative of the Academie Française. The reception also marked the opening of the "Men of the Old Stone Age" exhibit on the fourth floor of the Museum.

MR. MINOR C. KEITH has deposited the greater part of his archaeological collection from Costa Rica in the Museum as a loan. The collection consists of a large number of gold and jade objects and a very complete series of ceramics numbering many thousand specimens. To accommodate this loan collection, rearrangement of the Mexican hall has been made necessary. The small rooms adjoining the second floor entrance will be used temporarily for the exhibition of some of the casts formerly displayed in the Mexican hall.

THROUGH the coöperation of the Trustees and the personal interest of President Henry Fairfield Osborn, the employees of the American Museum have organized a store whereby they are enabled to secure food products at a slight advance over cost.

The initial steps for the organization were taken by a committee appointed by President Osborn, who having in mind the furtherance of his plan to benefit the employees materially, appointed a subcommittee of the Trustees to hear the plans of the organization and report the feasibility of the undertaking. The project received the sanction of the Trustees, a permanent organization was effected and an authorized capitalization of fifteen hundred dollars was voted by the employees. All of the money necessary to conduct the business has been subscribed by them and its affairs are administered entirely outside of Museum hours.

The store proper is advantageously situated in a room in the basement and the work there is performed by a storekeeper and assistant hired by the association. The project is distinctively coöperative, with authorized payment of dividends on capital stock, the creation of a reserve fund and the distribution of any remainder as a bonus according to the amount of the purchases of the subscriber.

Besides dealing in staple food products, the store supplies the employees with lunches, handles fruit and receives orders for certain other household commodities. The privileges of purchase have been extended to all employees and members of their families,

to those affiliated with the Museum and to the employees of similar institutions.

The store was opened for business on November 7. Its success has far exceeded the expectations of the officers and it will soon be incorporated under the laws of the State.

Word was received from the Congo expedition November 6, that twenty-two cases of zoölogical material had been shipped from Stanleyville. It is expected that Mr. Chapin will sail for home on the steamship "Hawaiian" on November 18 and that Mr. Lang will follow as soon as all arrangements for shipment of the remaining collections can be made.

SINCE the last issue of the JOURNAL the following persons have become members of the Museum:

Life Members, MRS. C. H. ISHAM and MESSRS. CHAUNCEY M. DEPEW, JR. and WILLIAM DUTCHER;

Annual Members, MRS. HENRY HERSEY ANDREW, MRS. G. A. ARCHER, MRS. GEORGE L. CARNEGIE, MRS. LEOPOLD COHN, MRS. GODDARD DUBOIS, MRS. F. LAWRENCE EMBREE, MRS. EDWARD N. GIBBS, MRS. GEORGE WALTON GREEN, MRS. CHARLES L. LIVINGSTON, MRS. HERBERT MCBRIDE, MRS. E. HOWARD O'FLYN, MRS. CHARLES LANE POOR, MRS. JOHN ROGERS, JR., MRS. J. TROWBRIDGE VREDENBURGH, MISSES MILLICENT F. EADY, M. D. GRAHAM, BLANCHE HIRSCH, FRANCES E. MARTIN, LOUISE VELITIN, DR. G. K. DICKINSON, DR. GEORG ORNSTEIN, and MESSRS. BENJAMIN ABERT, GEORGE GORDON BATTLE, A. H. BRAWNER, G. H. EISWALD, LEWIS A. ELDRIDGE, HENRY FLETCHER, GOELET GALLATIN, WALTER FULD GIPS, PETER GOULED, G. S. GREENE, JR., A. AUGUSTUS HEALY, FREDERICK R. HOISINGTON, ALFRED J. JOHNSON, LOUIS LONG, WILLIAM A. MOORE, AARON NAUMBURG, WILLIAM E. REED, E. QUINCY SMITH, RAYMOND W. STORM, MAURICE S. H. UNGER, ELMORE CURT WALTHER, LOUIS M. WEILLER and GEORGE L. WHELOCK.

IN the New York City building at the Panama-Pacific Exposition, the gardens, libraries and museums of New York will have a booth some twenty-four feet long at the left of the entrance, with interior and exterior wall space for the display of photographs. Each institution of the city has been allotted approximately ninety square feet of surface. The Museum's representative on the com-

mittee of arrangements is Dr. Chester A. Reeds of the department of geology and invertebrate palæontology.

THE MUSEUM has just received from Messrs. M. Guggenheim and Sons the gift of a small collection of prehistoric objects found in a copper mine at Chuquicamata, Chile. The collection consists for the most part of hafted stone hammers and wooden scrapers. These were the implements used by the Indians in pre-Spanish days in collecting the copper (atacamite) with which they made knives and other implements.

REV. GILBERT L. WILSON, who for several years has been working among the Hidatsa Indians of North Dakota under the direction of Dr. Clark Wissler, curator of the department of anthropology, has this year been devoting himself to the study of primitive Indian agriculture.

THE value to the artist and art student of the Museum's collections of objects from prehistoric and present primitive peoples is rapidly becoming known. There have always been a few teachers who have understood the richness and value of this field, and who have occasionally sent their pupils here to copy primitive designs and color schemes. The number of students who have availed themselves of this privilege during the last two years however reaches several thousand. For the study of conventionalized figures and color schemes to be employed in carpet, rug and wall paper manufactories or to fill some of the many needs where designers are required, there is certainly no better original field than that presented in the ancient Peruvian textiles and pottery vessels as well as in numerous objects in the American Indian collections on display in the American Museum.

THROUGH the courtesy of Dr. J. Leon Williams his private collection of casts of prehistoric human remains from the Pleistocene of Europe was placed on exhibition last winter in the fossil mammal hall on the fourth floor of the Museum, where it has attracted much interest. This exhibit has now been rearranged and greatly extended in connection with the studies upon "Men of the Old Stone Age" by Professor Henry Fairfield Osborn.

The new exhibit, opened to the public on

November 22 serves to show the progress of discovery, especially in the last few years with regard to the primitive races of man which inhabited Europe during and since the Great Ice Age. In addition to the casts of the more important skulls and other remains, there are weapons and other implements illustrating the successive cultural stages and illustrations of the remarkable drawings and sculptures preserved in the caverns of France and Spain. Reconstructions by Dr. J. H. McGregor of the heads of the three principal ancestral types of man, the *Pithecanthropus* or Ape-Man of Java, the *Eoanthropus* or Piltdown Man, and the Neanderthal Man (*Homo neanderthalensis*) are believed to be as nearly accurate as it is possible to make them. Two of Mr. Charles R. Knight's brilliant restorations further illustrate the appearance and habits of the most important types of palæolithic man, the Neanderthal and Cro-Magnon races. A series of skulls and other remains of living and extinct primates, lemurs, monkeys and anthropoid apes, serves for comparison with man's nearest relatives and collateral ancestors among the lower animals. The subject of prehistoric man, his ancestry, environment, habits and culture, will be fully and authoritatively treated in Professor Osborn's forthcoming book.

ALTHOUGH the City did not make the desired appropriation for the extension of the Museum's educational work, so many urgent requests have been received from teachers of the lower east side for the opening of a lecture center to accommodate the pupils who cannot come to the Museum that a local lecture center has been opened at the Washington Irving High School. The courtesy of the high school in placing its hall at the disposal of the Museum is greatly appreciated and marks an important step in the coöperation of public schools and the Museum.

MR. JAMES BARNES of the Barnes-Kearton expedition opened the series of lectures in the members' course on November 12 with one of the most interesting sets of motion pictures that has ever been shown at the Museum. Mr. Barnes has very kindly presented a set of his films to the Museum that they may be preserved as permanent records.

DURING the summer the scientific survey of Porto Rico made considerable progress. In

this work several departments of the Museum are coöperating with the New York Academy of Sciences, under whose general auspices the survey is being prosecuted. Following the preliminary work last spring by Professor Crampton and Dr. Lutz more detailed investigations were made during July and August. Mr. Roy W. Miner devoted several weeks to the study of marine invertebrates, especially those of the harbor of San Juan. He also made investigations at Ponce, Mayaguez and in some inland situations. Mr. John T. Nichols of the department of ichthyology and herpetology began the investigation of the fishes with very satisfactory results in the way of an extensive series of types and in the addition of new records to the little-known fish fauna of this island. Mr. F. E. Watson of the Museum with Mr. H. B. Barber of the Academy carried forward the entomological investigations on the island, making extensive collections in a number of the characteristic ecological localities.

In December Professor Crampton will make another visit to the island in order to present a report of progress to the Governor and Legislature of Porto Rico and to take back a series of named specimens which may serve as a nucleus for an island museum. He will also carry on field work in the region of Guanica Harbor and in the arid southwestern portion of the island where a typical desert locality is to be found.

MR. WILLIAM B. PETERS of the department of preparation and Mr. Prentice B. Hill, assistant in the department of geology, have returned from Weyer's Cave, Virginia, where they secured a quantity of material from grottoes which have lately been discovered in the cave. This is to be used, together with the collection made last year, in the reproduction of a typical grotto in the Museum, work on which is progressing rapidly.

MR. A. J. MUTCHLER and Mr. F. E. WATSON of the department of invertebrate zoölogy have recently returned from four weeks' work in Florida, where they have been making a survey of the insect life of the northern part of the state. In spite of the unfavorable weather conditions, more than eight thousand specimens of insects were secured.

DR. FRANK M. CHAPMAN has just returned from Heron Lake, Minnesota, where he made studies for a group of the birds of that region.

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